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Illustrated.

The Prospect for Copper

The forthcoming statistics for July are not awaited with anything more than a mild curiosity. Interest is directed toward what may be in three months rather than to what has happened in the month just passed. The kaleidoscope has been revolved by the announcement of curtailment of production by some of the leading producers.

As to this curtailment, we gather from the statements of Messrs. McNeill and Ryan that there is no formal agreement among the producers and no understanding limiting freedom of action, but that in discussing the situation it was recognized that for the time being the production was too large and that it would be advisable to follow the conservative policy already inaugurated by Calumet & Hecla and Phelps, Dodge & Co.; and reduce supplies until consumption should make a larger inroad upon the accumulated stocks. If one producer should make a move in this direction, the good sense of others would lead them to follow. This has happened.

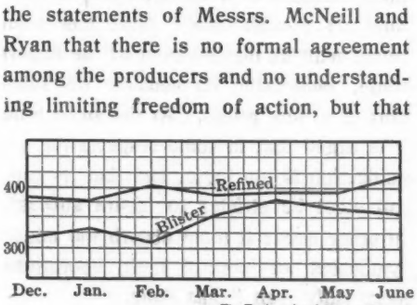


DIAGRAM SHOWING DAILY RATE OF REFINERY AND SMELTERY PRODUCTION

Utah Copper Company has announced its intention of contracting its output—extent not indicated. Nevada Consolidated has declared a reduction of 15 per cent. and Cananea the same. No definite word has come from Butte, but after the statements by Mr. Ryan, there is no doubt that operations there will be checked materially and it has been rumored that Cerro de Pasco may also go a little more slowly. The fact is that the enormous refinery production of June, reflecting the smeltery production of April, marked the culmination of the reckless operations that were bringing disaster upon the industry. The halt having been called, some of the smaller producers may adopt the policy of the larger and some may suspend entirely. It has been rumored that Imperial will do that. The California producers will probably have to reduce anyway, on account of their smoke troubles. Altogether, it seems likely that a reduction of American production to the extent of 300,000 to 350,000 lb. in the daily rate is to be expected.

The full effect of this reduction will not appear in the refinery statistics before the figures for October, but we anticipate that it will show gradually earlier than that. In the accompanying diagram are plotted the daily rate of production according to the refinery statistics, and the daily rate of smeltery production as reported by us for the last seven months The line for the smelters is below that for the refiners, because their reports are incomplete, but sufficient of their production is enumerated to give a close indication. Theoretically, the production of refined copper should rise or fall about two months after the crude copper, but practically the courses may be altered by the status of intermediate

stocks. However, in the long run the trends must, of course, be similar.

The production of crude copper attained a maximum in April. Since then there has been a reduction in the output of Butte, where the Clark works have been closed, and the importation of copper in bars, matte and ore has declined materially. This should be reflected to some extent in the refinery statistics for July, but for a month or two more, anyway, the decrease in the output of refined copper will be slow.

To what extent the market for copper will be affected by this change in conditions remains to be seen. With better management the market would not have been allowed to fall into the condition of semi-demoralization that characterized it at the mid-year. This condition inspired manufacturers with the idea that everything was in their favor and they allowed their stocks to run down to nearly the vanishing point without concern. Already there is a renewed feeling of confidence among the producers and a small improvement in price through the buying of those manufacturers who have awakened to the altered situation. It is decidedly good that there has been no such hurry to buy as might have produced a sharp advance. The result to be expected eventually, however, is the realization by manufacturers that producers do not intend to supply consumption at a price involving actual loss on 10 to 15 per cent. of the amount, followed by such purchases as will transfer to manufacturers' yards a large part of the visible supply. A curtailment of 10 per cent. of the world's production would still leave a long while for absorption of the present visible supply if consumption were to remain stationary, but as we have previously pointed out, industry cannot be safe with the absence of stock; the present stock is not, after all, of excessive magnitude, considering the rate of consumption and the chief thing is to remove the alarm about it and calm nerves.

If curtailment of production effects a moderate reduction of the stock and restores normal conditions by distributing the remainder among all parties of trade—producers, speculators, consumers—the industry will be reëstablished upon a healthy basis. This is to be anticipated if curtailment be sufficiently long continued.

German Iron Syndicates

For some years past the German iron and steel trades have been more closely controlled than that of any other important iron-producing country. This has not been done through the formation of large corporations, but by the organization of kartels or syndicates, each composed of a number of individual producers. Recently, however, a tendency has appeared toward breaking up these combinations and leaving open markets. Thus the pipe and tube syndicates have ceased to exist and the bar combination has almost broken up, owing to the withdrawal of some large concerns. Efforts to reorganize the wire convention have proved unsuccessful, and the syndicates controlling steel castings in the Rhine district and Silesia have failed to renew their agreements, which expired this summer by limitation. The important pig-iron syndicate has been disrupted by the secession of several large companies, and negotiations for its renewal are not promising.

The Steelworks Union, the largest combination of all, will end by limitation of its agreement in 1912. Meantime it is having its troubles, largely on account of disagreements over the allotment of production; though much fault has been found with its management of the export trade, especially on account of sales abroad at low prices. At the same time it is urged that in some respects the organization is too loose, and that its control must be stricter to insure success. In other words it must absorb the minor syndicates or control their operations more fully than it has done.

On the whole the present tendency in the German trade is disruptive rather than toward combination. The trade has had full experience of the syndicate system and seems to be disposed to try freer competition for a change.

The Nitrate Position

The production of nitrate of soda, which comes almost entirely from the Chilean fields, has now been carried on about a year free from the restrictions which for several years were imposed by the combination of the producers. The immediate result of the termination of the combine was a large increase in production. due to the opening of new *oficinas* and the increased work of existing ones. The enlarged supply, however, has not had the effect of depressing prices as much as might have been expected. This was chiefly owing to a contemporaneous increase in the consumption, due apparently to the more free supply and to efforts made to push sales in the chief consuming countries.

In the nitrate year ended June 30, 1910, a careful estimate of the production, based on statistics of exports, imports and deliveries, puts the total at 2,260,000 tons. This was an increase of 420,000 tons over 1908-9; a gain about equal to that of the period of five years from 1904 to 1909. The increase in the estimated consumption of the United States alone, last year over the previous one, was 109,000 tons, or more than 60 per cent.; and this was accompanied by only a very small increase in unsold stocks. The average estimated price in consuming countries in 1909-10 was $42.80 per ton; which compares with $48 in 1908-09, and with $52.80 in 1906-7, the year of highest prices. The American market at the present time ranges about $42 per ton, a drop of only about $3 from last year. This does not indicate any marked degree of oversupply.

Under these conditions all attempts to renew the combination have failed, and it appears probable that the free production will continue. No restriction of output is probable as long as Chile has a virtual monopoly and the present rate of consumption continues.

The decrease of 10,572,800 lb. in the European visible supply of copper in July is the largest reported for any month in 1910, and continuing the series of decreases that has been uninterrupted for five months it adds encouragement to the hope of better things to come.

It is now four or five months since there began to be serious talk of a general business depression, but while there is undoubtedly a relaxation in certain industries, the maintenance of railway earnings, the excellent reports from the electric manufacturing companies, and finally such a report as the last quarterly of the Steel Corporation, reflecting a basic and representative industry, do not indicate that anything very alarming is under way. There has been altogether too much hysteria.

CORRESPONDENCE and DISCUSSION

Views, Suggestions and Experiences of Readers

Fireproof Construction in Underground Stables

Some time ago the Illinois Legislature passed laws pertaining to fire-fighting appliances to be installed in all coal mines working in Illinois. Among other things they specified that under certain conditions, underground stables must be fireproof. It has occurred to me that to meet this condition it might be well to put in iron stalls in barns instead of reinforced concrete as some are doing. I have had a sketch drawn up of such an iron stall in which the sides are corrugated iron and the props 4-in. steel pipe. The trough to be built of wire mesh and the feed box to be of pressed steel. The price of construction as put on this stall seems to me to be rather high, and I would like to ask whether in your experience you have heard of mining companies using iron stalls, also whether any iron stalls are on the market; also if in your opinion there are any objections to the use of such a stall, which objections would not hold for the reinforced concrete stall?

C. F. Breen.

1368 Fullerton avenue, Chicago, Ill.

[We shall be pleased to hear from other engineers on this subject.—Ed.]

The Decline of Prospecting

This subject has been approached from various points of view. The June issue of *Mines and Methods*, in an editorial, discusses the subject along the probable real lines that strongly influence conditions. Recently a different phase of the question was forcibly called to my attention. For a number of years past a property had been worked in a desultory sort of way, yet in the last three years several deposits such as that to which I shall refer have been encountered and a number of cars of nominally high-grade ore have been shipped. Numerous prospects in the vicinity have been touched and a few prospectors continue to spend their grubstake in the adjoining hills, doing their "little stint" each year and living in the hope that "things will change."

Apathy over High-grade Rock and Nuggets

The incident to which I refer is that of the showing, on the streets of Helena, samples of gold rock that attracted about as much attention as would a piece of brick wrapped in tissue paper. These samples were part of a lot of 89 lb. which showed gold all through it. The lot, at a local assay office, yielded 128½ oz. of gold. This came from a place not over 25 miles from Helena.

Coincident with this from a more distant camp are reports of similar discoveries, the gold of which was in pieces as large as the slug of a 45 six-shooter. Again during the last few days, 28 oz. of nuggets were displayed in the show window of a prominent jewelry store. These were taken from mother earth last season not over eight miles from town. They attracted passing attention.

There are yet left in the hills of Montana some of the old-time prospectors and some of them have good prospects, but what hope is there for them when such apathy is shown toward such showings as those above mentioned? In the face of such conditions it is not surprising that there is a real decline in prospecting. When those who have the hardihood, and can meet the costs of higher living and other conditions cannot market a good property, even at ridiculously low figures, there is little inducement to go into the hills as a means of livelihood.

Effect of Development of Copper Properties

Why these conditions? This is a question susceptible of many answers. There is no dearth of capital inquiring for mining property. Under the present conditions of the copper market, with the consumers living in faith of the low costs of producing, which have been so widely advertised, this capital is looking for copper, even going to extremes in silver districts, sinking deep that they may find the copper below the silver zone. This is one answer and pertinent to Montana at least.

Around Helena there is an area of 20 by 35 miles, which has produced from $250,000,000 to $300,000,000 in gold and silver with some lead. Yet with the exception of Corbin, Radersburg and slight signs of life at Marysville, the present production is insignificant.

That the country is worked out can be disproved in numerous places where the few prospectors have worked or are working. There are excellent showings of gold, silver, lead and zinc ores in shallow workings, and not inconsiderable areas of dredgeable ground that was beyond the reach of the old-time placer miner. Most of these offer inducements to small capital and small combinations of capital for their exploitation and would, if legitimately investigated and developed, yield large returns on the investments. Then, too, there are many mines worked in the early days that will fully justify rehabilitation and pay good returns. The prospector and owner, not having sufficient capital, waits and the would-be prospector hesitates.

L. W. C.

Helena, Mont., July 26, 1910.

The Weight of Learning

Every once in a while an article upon the subject of the standardization of the size of technical books appears under the above or some equally humorous title. Those who have written before me have covered the subject far above my power to add or detract. However, as all reforms have been effected by noising abroad the existing evils, I wish to add my little share to the noise, even if it is only by furnishing the "loud cheers" for the parentheses.

Difficult to Pack Books of Different Sizes

The general cry seems to be against the motley array of sizes and shapes, and the disparity of weight, of technical volumes. Even the engineer who carries only what he considers absolutely indispensable books has a hard time of it. The best he can do in the way of packing them is not much better than shipping them loose in a freight car. In fact, I have often thought of resorting to the latter method. The books could not arrive in any worse condition and the trunk would come through much better. The only thing that has restrained me is the thought that the efficient corps of trunk smashers, employed by every uptodate railroad, could not be fooled by so simple an expedient.

I once had a box built of strong, well seasoned lumber, securely put together and well braced. It had a cover which swung on heavy hinges and fastened with a strong padlock. It was 5 ft. long, 9½ in. wide and 7 in. deep, inside. This allowed six of my books to fit in without chance of movement. The remaining 3 ft. 9 in. I filled with the rest of my books and baled hay. As it did not take much hay, I suppose I should not kick, but ever since I first packed that box I have dreamed of a happy day when all my books would go into position and stay there like those first six—without the hay. Then they would always be packed for I

would use the box as a bookshelf, and all that would be necessary when changing headquarters would be to lock it.

Someone has aptly remarked that we cannot expect the publishers to get together of their own accord and adopt a standard of size. One suggestion advanced was that writers insist on their efforts being published in volumes of standard size. That is a good idea. First, however, the standard sizes must be decided. It would seem to me that the best way to settle the matter would be through the colleges. If all the technical schools in the country would decide on two or three standard sizes and then insist that all textbooks used in those institutions be printed in one of those sizes, a big advantage would be gained. The point is to force the colleges. This might be accomplished if every man who is interested would write to the school nearest him, spiritually or geographically, stating his wish that the schools set the standard in this matter.

HOWARD W. MORGAN.

Milwaukee, July 27, 1910.

Western Charcoal Furnaces

I note in your issue of July 16, relative to the formation of the Lake Superior Iron and Chemical Company, that you state that by the formation of this company, practically all of the Western charcoal furnaces are under one management. This is an error.

In addition to Marquette furnace of the Cleveland-Cliffs Iron Company you have omitted Gladstone furnace, at Gladstone, Mich., and Carp furnace, at Marquette, Mich., both owned by the same company. You have also omitted the furnace of the Antrim Iron Company, at Mancelona, Mich., the Cadillac Furnace Company, at Cadillac, Mich., the Spring Lake Furnace Company, at Fruitport, Mich., and the East Jordan Furnace Company, at East Jordan, Mich. These furnaces should have a total output of about 222,000 tons of charcoal iron yearly.

AUSTIN FERRALL.

Marquette, Mich., July 19, 1910.

? QUESTIONS and ANSWERS •

INFUSORIAL EARTH

What are the principal uses for infusorial earth? How it is prepared for market? What is it worth, and where are the principal deposits?

R. B. B.

Until recently, the principal uses for infusorial earth have been for polishing powders, scouring soaps, filter stones, as a wood filler, and in the manufacture of dynamite as a holder of nitroglycerin. The porous structure also renders it a nonconductor of heat, which, in connection with its lightness has extended its use as a packing material for safes, steam pipes and as a fireproof building material. Another new use is in the manufacture of records for phonographs. For this purpose it is boiled with shellac and the resulting product has the necessary hardness to give good results.

In the preparation of infusorial earth for the market it is first roasted in order to destroy all organic matter and expel nearly all of the water. It is transferred to flame or muffle furnaces and heated at a higher temperature. The earth is then ground to a fine powder and screened. The moisture should be less than 1 per cent.

The market price of infusorial earth for best American ground is 1¼c. per lb. That of German ground, 2½ to 2⅝c. per pound, f.o.b. New York. Among the New York dealers may be named W. H. Whittaker, 24 Front street, Hammill & Gillespie, 240 Front street, and T. Van Amringe, 241 Water street. The principal deposits are in California, Connecticut, Illinois, Maryland, Massachusetts, Missouri and New York. The imports amount to $25,000 to $30,000 annually.

AIR METERS AND COST OF COPPER

(1) Is there any meter made that will show the amount of air used in a mine to run drills and other machines? The situation is this: Air is used from a common source both in the mine and smeltery. It is desired to find out the amount of air used separately in the mine and smeltery.

(2) What is the cost of producing one pound of copper by the system employed by the Tennessee Copper Company?

U. H. S.

(1) Meters for measuring compressed air are made by the General Electric Company, 30 Church street, New York; the Metric Metal Works, Erie, Penn.; and by G. C. St. John, 140 Cedar street, New York.

(2) The operating cost of delivering one pound of copper f.o.b. cars at Copperhill, Tenn., by the Tennessee Copper Company was 0.0928c. for 1908 and 0.09153c. for 1909. The total cost after adding freights, commission, taxes, legal expenses, administration and all other expenses was 10.68c. per lb. The cost of electrolytic copper, after allowing for silver and gold, was 11.19c. per pound.

MARKET FOR ANTIMONY ORE

Is there any smelter in the United States who buys antimony ore? Is there any other buyer? What is the value of an ore containing about 62 per cent. antimony, together with some silver?

H. B. H.

No antimony smelter in the United States is operating at present. Most of the ore and metal houses will buy antimony ore for export. Consult the advertising pages of the JOURNAL. The market for antimony ore is confined to so few smelters that the price is chiefly a matter of private contract. It may be possible to sell in Europe at a price corresponding to 90 per cent. of the antimony content of the ore at the market quotation for the metal, less 2½@3c. per lb. The subject of payment for the gold and silver content of an antimony ore is one upon which smelters are apt to be reticent. European smelters pay for the precious metals in some cases; in some cases they do not. Some smelters are able to recover the precious metals; others are not.

MOLYBDENITE ORE

I have a number of molybdenite claims in British Columbia, eight miles from railroad station. The vein is 3 to 4 ft. wide and assays 20 per cent. and upward of molybdenite. Can 20 per cent. molybdenite ore be shipped profitably from this section? Can it be concentrated? If so, what is the process? Is there a steady market for this class of ore, and what is it worth?

E. K. M.

During 1909, only about 15 tons of molybdenite were produced in the United States. The demand for molybdenite is not large, as its principal use is in the manufacture of molybdenum steel. Molybdenite is found sparingly in many parts of the United States in which granitic rocks abound, though the number of places at which it is found in commercial quantities is not great.

The ease or difficulty of concentration has much to do with the feasibility of mining molybdenite deposits. Unless the mineral occurs in large lumps, so that it may be hand picked, it seems to be difficult to find a satisfactory method of separating molybdenite from its gangue. Inventors of both oil and electrostatic methods of concentration claim that molybdenite can be successfully concentrated by this method. However, this has not been worked out on a commercial scale.

No separate record is kept of the imports or exports of molybdenum minerals or salts. The quantity, however, is not large in either case. Both molybdenite and wulfenite ores are mined. The price of molybdenite ordinarily ranges between 20c. and 30c. per lb. for materials carrying 92 per cent. of molybdenum sulphide. The price of wulfenite is a matter of contract, depending largely upon the purity of the material. The price of the metal is about $1.50 per pound.

The principal users of molybdenite are the Primos Chemical Company, Primos, Delaware county, Penn.; Friedrich Krupp, Essen, Germany; and De Golia & Atkins, San Francisco, California.

July Dividends

The accompanying table shows the amount per share and total amount of the dividends paid during July, 1910, by a number of mining and industrial companies in the United States, Canada and Mexico.

U. S. Mining Companies.	Situation.	Amt. per Share.	Amt. Paid.
Am. Smelt. & Ref. Co., pf.	U. S.	$1.75	$875,000
Am. Smelt. & Ref. Co., com.	U. S.	1.00	500,000
Am. Zinc Lead	Kan.	0.50	40,060
Boston & Mont., c.	Mont.	4.00	600,000
Bunker Hill & Sull., s.l.	Ida.	0.30	98,100
Colorado Dredging, g.	Colo.	0.25	25,000
Copper Range, c.	Mich.	1.00	384,185
Daly-West, s.l.	Utah	0.30	54,000
Grand Central.	Utah	.....	30,000
Guggenheim Expl.	U. S.	2.50	519,832
Hecla, s.l.	Ida.	0.02	20,000
Homestake, g.	S. Dak.	0.50	109,200
International Nickel, com.	N. Y.	25.00	2,218,165
National Min.	Nev.	0.05	37,500
New Idria, q.	Cal.	0.30	30,000
Old Dominion, c.	Ariz.	0.25	40,500
Osceola, c.	Mich.	4.00	384,600
Pearl Cons., g.	Wash.	.....	19,707
Republic Mines, g.	Wash.	.....	25,000
Shattuck-Ariz., c.	Ariz.	1.00	350,000
Snow Storm, s.l.	Ida.	0.01½	22,500
Tonopah, s.g.	Nev.	0.40	400,000

U. S. Industrials.	Situation.	Amt. per Share.	Amt. Paid.
Am. Cement.	Penn.	$0.10	$20,000
General Chem., pf.	U. S.	1.50	150,000
Nat. Lead, com.	N. Y.	1.25	258,292
Pittsburg Coal, pf.	Penn.	1.25	371,262
Republic I. & S.	Ill.	1.75	357,296
Sloss Sheffield	Ala.	1.75	117,250
Va.-Car. Chem., pf.	U. S.	2.00	360,000

Foreign Mining Companies.	Situation.	Amt. per Share.	Amt. Paid.
Buffalo, s.	Ont.	$0.05	$50,000
Coniagas, s.	Ont.	0.15	120,000
Crown Reserve, s.	Ont.	0.15	262,500
Esperanza, g.	Mex.	0.36	163,800
Guanajuato Dev.	Mex.	3.00	30,000
Hedley, g.	B. C.	0.30	36,000
La Rose, s.	Ont.	0.10	149,840
Lucky Tiger, g.	Mex.	0.05	35,750
McKinley-Darragh, s.	Ont.	0.05	112,385
Temiskam'g&H.B.	Ont.	3.00	23,283

Chronology of Mining for July, 1910

July 1—Bureau of Mines established with George Otis Smith, director of the Geological Survey, as temporary head.—Bully Hill smeltery, Shasta county, Cal., closed by order of Federal agents.

July 2—New York State authorities recommend action to abate alleged fume damages from the smelting and chemical works, at Bayonne, N. J.

July 3—Surface plant of Vulcan Sulphur Company, Vulcan, Colo., burned.

July 5—Suit involving Creede, Colo., mines, decided by Supreme Court after 11 years' litigation and resumption on the Amethyst and other mines can now proceed.

July 6—Water in the Comstock mines of Nevada lowered to 2502 ft., the lowest point since the flood of 1885.—Verdict against George D. Barron, of New York, for $11,529,542 rendered in Mexican courts, the case growing out of the negotiations involving the Teziutlan copper mine, in Pueblo, but not involving the Teziutlan Copper Company.

July 7—The Mines Company of America absorbs the El Rayo and Dolores companies in Mexico, and increases capital to $9,000,000.—The Chino Copper Company let a contract for a 3000-ton mill to be erected in Silver City district, New Mexico.

July 8—Nevada "wildcat" mining law sustained by the State Supreme court.

July 12—Injunction against Davis-Daly tramway, at Butte, dissolved by Supreme Court.

July 14—Apex suit against Tuolumne Copper Mining company brought by the North Butte company.

July 15—Washoe sampling mill, Butte, Mont., burned; loss, $75,000.—The Kennon Coal Company's power plant at Flushing, W. Va., burned.

July 18—Colorado chapter of the American Mining Congress organized with D. W. Brunton as president.

July 19—New Portland cyanide mill at Cripple Creek started.

July 25—Fires started, smelting begun at Tooele plant of International Smelting and Refining Company.

July 26—Utah Copper Company announced its decision to curtail production because of unsatisfactory market conditions.

Michigan Men in Finland

Capt. James Inch, of the Franklin mine, has been placed in charge of operations in Finland, of the Orijarvi Shaft Company, controlled by Houghton, Mich., interests. The Orijarvi shaft is 50 miles from Helsingfors, Finland. President John Daniells of the company is at the mine and probably will remain there about a year. Paul Routtinen, chief carpenter boss for some years at the Franklin, Jr., mine, has left Michigan for Helsingfors, from where he will go to the Finnish-American properties and supervise the carpentering in the construction of the mill and concentrator. The mill and concentrator are to be on Lake Ori, about five miles from the Orijarvi shaft. They will be thoroughly modern and will be equipped, largely, with American-made machinery. The equipment for the plant already has been ordered and will arrive on the ground during the present summer. Only ore from the large stockpile of the Orijarvi will be handled in the mill and concentrator for some time, as all efforts in the mine are being concentrated on development. The stock pile contains a large amount of copper and zinc ore, which was taken out of the mine by its ancient workers.

Another Fire in the Geological Survey Building

WASHINGTON CORRESPONDENCE

The periodical fire in the Geological Survey building broke out on July 31 and again imperiled the maps and records of the Survey in a way that caused the officials, who were aware of the occurrence, considerable alarm. This was the fifth time in the last seven years that the Survey has suffered from the danger of fire. On this occasion, the direct damage was largely confined to a retail shoe shop immediately under the quarters of the Survey, but the possibility of loss was even greater than it has been on some former occasions. There was a slight damage to the books, inasmuch as the spray from the chemical extinguishers spotted some of them, and will necessitate their being rebound. Speaking of the fire, Director George Otis Smith says:

"The fire which occured in the Geological Survey building originated in and was largely confined to the first floor of the building, occupied by other tenants. It gives emphasis, however, to the wisdom of Congress in authorizing at its last session the preparation of plans for a Government building that will not only be better adapted to the particular needs of this scientific and map-making bureau, but will insure the safety of the public records that have been five times endangered by fire. The fire of today originated in one of the several stores over which the Survey watch force has no control, but in a few moments the flames had burst through into the library, situated directly above. The loss of Government property is thought to be less than $1000, but an incalculable loss might easily have been incurred in this library, which is unique in its collection of geologic literature, containing as it does, more than 65,000 volumes, as well as 85,000 pamphlets and 35,000 maps, and constituting the most complete collection of geological works and maps in the country, if not in the world. The destruction of these by fire would have deprived not only the geologists of the Survey, but the scientists of America, of a reference collection that could not be duplicated."

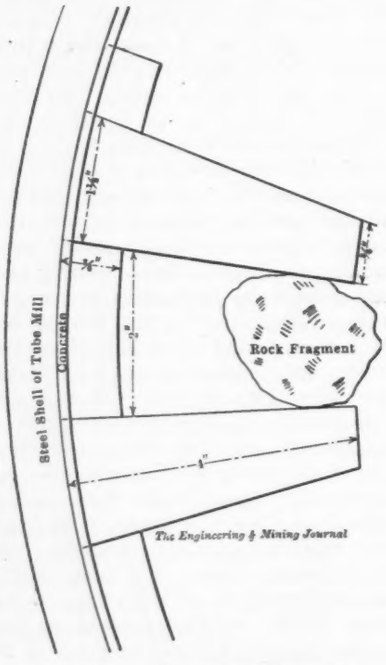
The registered output of silver on the west coast, Tasmania, reported by W. H. Wallace, secretary for mines, for the first quarter of 1910, amounted to £37,138. The Zeehan-Montana mine is the largest producer.

DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Tube Mill Linings in Use on the Rand

A tube-mill lining invented by Mr. Osborne, late cyanide manager of the Glen Deep, Ltd., has come largely into use on the Rand. It appears to be a modification of the original El Oro lining. It consists essentially of two bars placed in such a manner that with the aid of cement concrete they lock themselves in the interior of the tube mill. The horizontal bar is about 2 in. long and about ¾ in. wide. The other bar, at right angles to the first, is practically of



SECTION OF TUBE-MILL LINING

the same section as a grizzly bar, and is 4 in. long and ¾ in. in thickness at the end projecting into the mill, and 1½ in. in thickness at the base. Concrete is laid on the bottom and part of the sides of the tube mill, with the bars placed in position, as shown in the sketch. The bars should be kept in position with wood framing and wedges, while the other portions of the lining are being laid.

Neglect of the precaution to hold the bars in position by framing until all the bars are laid and the concrete is set recently led to a fatal accident; a native was killed by the lining collapsing upon him. This lining holds banket fragments between the upright bars, which are made of specially hardened steel, and last without renewing for about a year, when the bars need replacing. The use of banket for pebbles is now universal and at the Dreifontein mill of 220 stamps, about 1200 tons per month of bankets are thus crushed direct in the tube mills.

Cementing Off Water from Oil Wells

BY ALGERNON DEL MAR*

Among the many applications of the use of cement in the mining industry none is more interesting than the method of shutting off water from an oil well. The method is well worthy of study for modifications to suit the circumstances might be employed by the miner when sinking shafts in wet ground. The usual method of pumping the shaft sump free of water while putting in a cast-iron lining is expensive, but perhaps not more so than the freezing process. An oil well having a comparatively small diameter as compared with a shaft, does not permit of the same procedure and as a consequence other methods have been devised. The method here described is used in the Coalinga oilfield, of California.

To begin with, the casing is moved up and down many times and a bailer run after each time to remove the mud and slime from the bottom of the hole. Then in order to get a good circulation through the water-bearing formation, the casing is filled to the top with water and a cap fastened on. A force pump forces water down this casing, around the shoe of the casing and outside of the casing between it and the walls of the hole. When a perfect circulation has been obtained, the cap is taken off and a 3-in. pipe put down to the bottom of the hole through the casing, which may be 10 in. in diameter. The pump is connected to this 3-in. pipe and a soft cement forced through it and then up outside the casing filling the space between casing and walls of the hole with cement. When all the cement has been pumped down, the casing is dropped to the bottom and tightly forced down to keep the cement outside the casing. From two to four tons of cement may be required and after 10 to 14 days the tools are lowered and the surplus cement in the casing bored out.

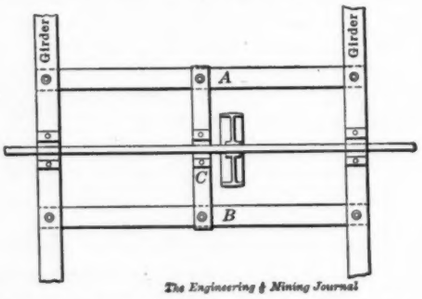
*Mining engineer, Los Angeles, Cal.

Many variations of this method are used in the California oilfields, but the essential facts are the same; first, a good circulation to clear the passages for the cement, and second, the forcing of the cement into the spaces.

Reinforcement of Shafting

BY JAMES L. BRUCE*

In planning to set mill machinery it is customary to arrange the pulleys, transmitting the heavier loads, as near the bearings on the shaft as possible, in order not to cause undue bending of the shaft with greater friction, loss of power and breakages. However, it is frequently found necessary either on the original plans or when subsequently adding more machinery, to place a heavily loaded pulley at some distance from a shaft bear-



METHOD OF REINFORCING LINE SHAFTING

ing. This sometimes causes sprung shafting with its attendant delays and troubles.

A quick and cheap remedy can be supplied by building in an intermediate bearing. Two heavy timbers *A* and *B* on opposite sides of the shafting, and parallel to it, are bolted above or below the girders on each side of the pulley. A third timber *C* is bolted to these to hold the intermediate bearing. All belts are then thrown off this section of shafting and the intermediate bearing properly lined in, belts replaced and machinery started again.

The Miners' Protective Association, of Pine Creek, has been organized by 30 operators and prospectors on the north side of the Cœur d'Alene mountains, in Shoshone county, Idaho, to save the standing timber on mineral ground, as it is claimed its harvesting would injure the mining industry.

*Manager, Continental Zinc Company, Joplin, Mo.

Fair Leads on Dredges

The old type of fair lead, used on most of the California dredges is satisfactory for handling the side lines, but entirely inadequate for the bow lines. The original type of fair lead consists of two horizontal rollers between which the lines pass. As the boat is swung, the rollers are supposed to revolve with a rope, allowing it to run smoothly. However, grooves are soon worn on the rollers so that the lines do not slide freely and as a consequence are subjected to excessive wear and as soon as they become worn, they no longer rotate as the line plays between them. A fair lead of this type takes up vertical motion of lines, but is absolutely worthless when the lines swing horizontally. Fig. 1 shows an end view of this fair lead.

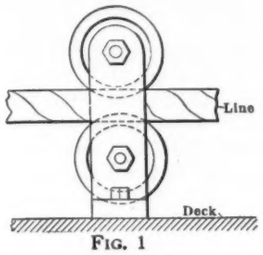


FIG. 1

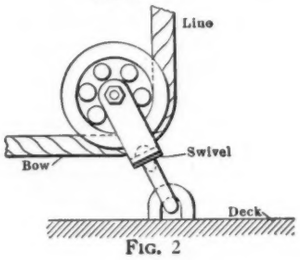


FIG. 2

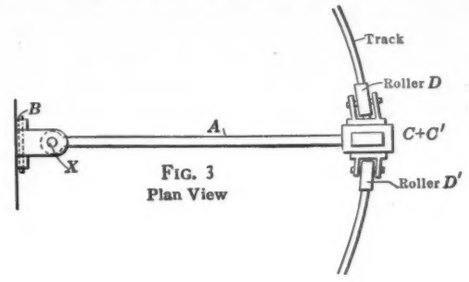


FIG. 3
Plan View

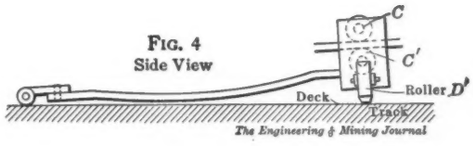


FIG. 4
Side View

FAIR LEADS USED ON CALIFORNIA DREDGES

THE MILES FAIR LEAD

Fig. 2 shows two fair leads which were designed by J. H. Miles, superintendent of the Folsom division of the Natomas company, and which are now used on many of the California dredges. The one shown in Fig. 2 is used for the port-bow line. It consists simply of a heavy block or pulley fastened by a swivel to a staple on the deck of the boat. As shown in the sketch the axle of the pulley wheel is held in a frame made of a single piece of steel plate bent up on either side of the point to which the swivel is fixed. On the port side old bucket-chain cables are used for bow lines and usually last about eight months.

The fair lead used on the starboard side of the dredge is shown in Figs. 3 and 4. A swinging arm *A* is pivoted on a vertical axis *X*, to a piece of sheet steel bent about a horizontal axis *B* on the deck. At the other end of the arm is the arrangement for guiding the line. There are two rollers between which the bow line passes, set one above the other in a heavy frame. In this frame there are also two rollers *D* and *D'* which travel on a track laid on the boat's deck and on an arc of the circle whose center is at *X*. As the dredge swings, the arm *A* rotates about its axis *X*, the rollers *D* and *D'* traveling along the track upon the deck. To accommodate the vertical motion of the line the arm *A* may swing about the horizontal axis *B*. Thus, motion of the line in all directions is taken care of and free play is provided for, there being a minimum of friction at all times.

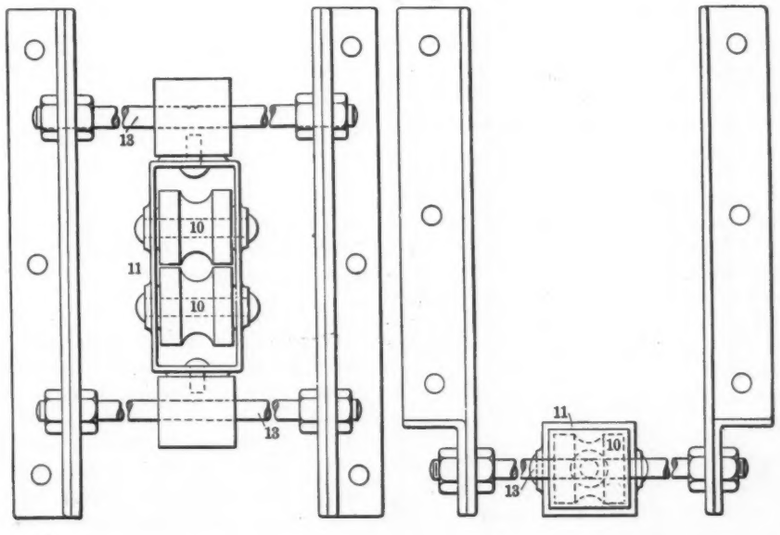


FIG. 5. FRONT ELEVATION AND PLAN—HORTON FAIR LEAD

HORTON FAIR LEAD

The Horton fair lead has lately been introduced on some of the boats operating near Oroville, Cal. Fig. 5 shows a front elevation and plan of this fair lead, the invention of Eugene L. Horton, of Oroville. The line passes between two 7-in. rollers, 10, mounted upon a frame, 11, that slides on two horizontal rods, 13. This sliding motion allows for horizontal movement, and the pulleys take up the vertical deflections of the rope of the bow line before it passes to double-deck pulleys. This fair lead can be used successfully with banks up to 30 ft. high and allows the dredge to swing 200 feet.

Future Policy on the Rand*

Hugh F. Marriott, in the course of a speech made at a dinner given to him by Lionel Phillips, remarked in his final summing up of the future policy of the workings on the Rand:

"Run your mills to suit your mine and not as heretofore your mine to suit your mills. The limiting factor is the amount and efficiency of the labor force below, which is employed in extracting that portion of the orebodies standing on the company's books as capable of producing a fair profit. All other details of mine and surface operations are subservient to this item.

"Generally speaking, the hanging up of a certain number of stamps in a Witwatersrand mill has given rise to a certain amount of apprehension in the minds of shareholders. The operation of a lesser number of crushing units means, of course, reduced tonnage, but the public needs educating up to the fact that the hanging up of a certain number of stamps does not necessarily mean a reduced profit. On the contrary, it may mean a larger earning as figures from the Robinson Deep prove. It will be our endeavor to direct attention to further examples of true economy being prac-

*Abstract of an article in the *South African Min. Journ.*, May 14, 1910.

tised in this manner when such cases come under our notice.

"It is all very well for a mine to continue to run its rated mill capacity so long as its operation is consistent with true economy and the normal ore of the mine, but when a battery is kept running at full capacity with a shortage of labor, necessitating extensive machine drilling and the widening of stopes merely to avoid the publication of a statement showing that a portion of the plant is idle, the system certainly calls for reform."

Methods of Mine Surveying

By W. H. Hendrickson *

While mine surveying is simple in principle, speed and accuracy depend upon the use of methods adapted to conditions and as self-checking as practicable. Both the underground and surface surveys should start from the same baseline and origin of coördinates. A long, straight crosscut tunnel makes the best baseline for both, the line defined by permanent plugs in the roof. The true bearing of this should be determined from Polaris at elongation.

Surface Work

In surface work the points may be carried on stakes 3 ft. long by 2 in. square, placed at commanding points, extending about 18 in. above ground and supported by stones, topped by a 10d. nail. Backsights, foresights and elevations are taken on the nailhead. A 300-ft. tape is a convenient length.

At each setup, the horizontal angle to the right, and vertical angle to foresight with telescope both upright and plunged, the magnetic bearings, inclined distance and hight of instrument are noted. Additional foresights on stakes some distance back are useful as checks. A direct observation on the sun to check bearings is useful.

Underground Surveys

Underground work consists of the basic transit survey of levels, shafts and raises, and the supplementary stope surveys, which may be made with a hand-transit compass. The transit survey should be a closed survey, returning on temporary points if necessary. The survey points may be ⅜-in. screw eyes, placed vertically in wooden plugs driven into holes drilled in the roof, or screwed into timbers. The instrument is set up under a plumbbob, and back and foresights taken on a plumbbob string, a piece of opaque white paper being held behind the string and a light at the side of the string.

The procedure is: Set "A" vernier at zero, sight on backsight, note magnetic bearing; sight on foresight, note horizontal angle to the right, also the magnetic bearing. See that the difference of magnetic bearings check the angle. Repeat the angle with plunged telescope and "B" vernier. Measure the horizontal distance. The note book should contain columns for: Course, horizontal angle, true bearing, magnetic bearing, horizontal distance, backsight and magnetic bearing to backsight. The elevations should be taken by rod leveling. The stations should be numbered according to some system, so that the different mine workings can be conveniently referred to them, as "7 crosscut," "100 level," "102 stope," etc.

Shaft Plumbing

In plumbing shafts, two No. 12 copper wires may be each supported through a notch filed in the head of a 30d. nail at 45 deg. into the edge of a timber nailed across the shaft. Weights immersed in pails of water, are hung on the ends of the wires. The sights are taken tangent to the wires. A small cord stretched to both wires is a convenience in setting up the instrument.

Stope Surveys

Stope surveying, for stope and assay maps, may be done with a Brunton or other compass, by using a course of the transit survey as a baseline and taking the angle between back and fore magnetic bearings at each sight. The outline of stopes may be shown by taking contours at convenient regular intervals. For example, in a vertical orebody with square-set timbering, take the outline of each floor. These contours may be mapped on tracing cloth, one map for each mine level. The maps, being semi-transparent, can be superimposed to show the course of an orebody through the mine. From the stope maps enlarged sheets can be made for the assay maps.

*Mining engineer, White Plains, N. Y.

The interest displayed in Mattagami lignite has decided the Canadian government to operate a plant for testing peat and lignite. In the vicinity of Hudson bay there are thousands of square miles of peat bogs.

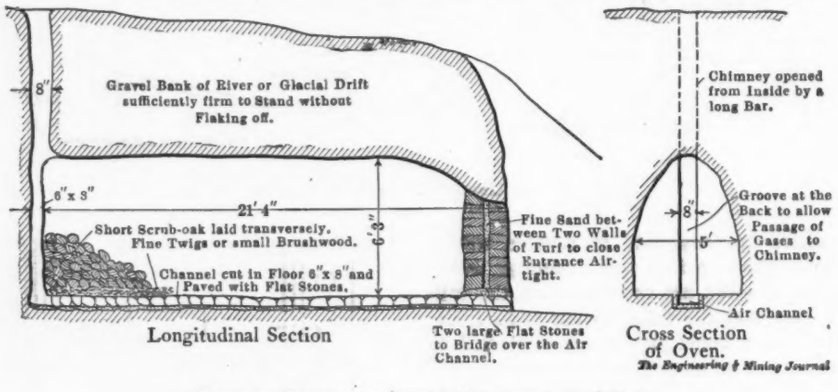
A Simple Charcoal Oven

By A. Livingstone Oke*

The accompanying notes and sketches show a type of charcoal oven commonly used in Chile and elsewhere in South America. The oven is excavated in a bank of gravel sufficiently cemented to stand without flaking or scaling. Ordinary recent alluvial or glacial drift is suitable for the purpose.

Charging the Oven

The oven is charged by first laying small brushwood in the air channel shown along the bottom and the floor is also covered over a few inches deep with the same material. The sticks of wood are then laid across the oven, on top of the layer of brushwood. When the oven is full almost to the mouth, allowing space for the double wall of turf or stone, a quantity of dry twigs and easily burning wood is put in the front and ignited. This fire in the mouth is kept going for an hour or more, fresh fuel being added to prevent too much of the wood inside from being consumed. This preliminary firing is to get the charge thoroughly heated, and during this stage the greater bulk of the gases and volatile matter come off in dense clouds of dark smoke.


8"
Gravel Bank of River or Glacial Drift sufficiently firm to Stand without Flaking off.
6"x 8"
21' 4"
Short Scrub-oak laid transversely. Fine Twigs or small Brushwood.
Channel cut in Floor 6"x 8" and Paved with Flat Stones.
Fine Sand between Two Walls of Turf to close Entrance Air-tight.
Longitudinal Section
Two large Flat Stones to Bridge over the Air Channel.
Chimney opened from Inside by a long Bar.
8"
Groove at the Back to allow Passage of Gases to Chimney.
5'
Air Channel
Cross Section of Oven.
The Engineering & Mining Journal

Type of Charcoal Oven Used in the Andes

Sealing the Oven

When considered to be properly ignited, the double wall is built, the inner part being first completed up to the roof and then the outer wall built, fine sand, clay or earth, being rammed tightly between them, to render the mouth air tight, except the small air channel, left for the admission and control of the air along the bottom of the oven. The operation of closing the mouth is the more important because on it depends the success of the whole firing. If insufficiently stopped, air will enter, resulting in the reduction of wood to cinder and loss of most or all of the charge.

*Mining engineer, Argentine & General Exploration Company, Rodeo, San Juan, Argentine.

The air channel at the bottom is left open until the smoke coming out is a thin white color, which may be in from 12 to 24 hours, and then this opening is also carefully sealed up. The upper end of the chimney is left open a little longer and finally closed with clay. The oven is now left three or more days, to cool down; if it is opened too soon there is a risk of the charcoal starting to burn again.

Yield of Charcoal

The particular oven shown was excavated in fairly firm gravel for 3 pesos per meter (one Argentine peso equals 44c.), costing altogether about 25 pesos, including stone work, chimney, wheeling, etc. A native miner will drift about one meter per day in this class of ground on contract. The oven will hold about 5000 lb. of wood. If properly fired it will produce 1170 lb. of charcoal. The contract price delivered at the mines is 34.20 pesos per ton of 2000 pounds.

The wood available at these mines, in the province of San Juan, Argentine, at an altitude of more than 10,000 ft., is a hard but highly gaseous scrub oak. The charcoal produced is dense and heavy, with a clean, silky fracture. It makes excellent fuel for a wind or muffle assay furnace. In the forge it will give a fair welding heat.

One sack (58 lb.) of this charcoal in a wind furnace, nine inches square, will give four fusions of nine pots, at a cost of about three centavos per pot. It will be noted that the percentage of charcoal produced is 23.7 of the original weight of the wood. By analysis, this same wood only gives 26 to 33 per cent. carbon. The charcoal from the oven will probably retain some gas but the efficiency would still seem to be excellent.

Modification of Oven Increases Yield

The charcoal has 4 to 5 per cent. of ash, equal to 1 per cent. in the original wood.

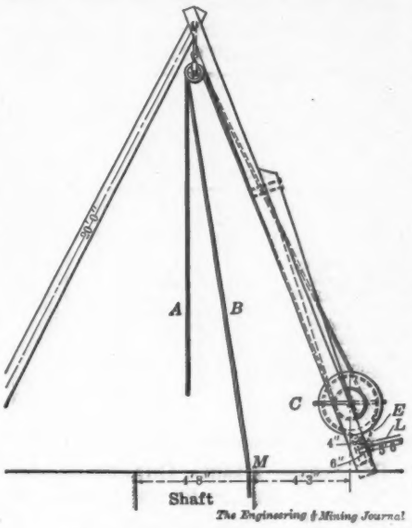
To obtain this maximum output of charcoal, I found it desirable to modify the oven and the mode of operating it as follows: A second chimney was put in the center of the oven. The front of the furnace is now carefully closed, air tight, and the charge fired at the bottom by means of the entrance to the air channel left for the purpose. On first firing, the chimney at the back is kept closed until only white smoke issues from the one in the center. Then the latter is closed and the back opened. Finally all three openings are closed and the oven left to cool.

In the matter of charging the wood, it was also found better to stand the wood upright with the bigger ends uppermost. These various modifications on the usual native method of operating increased the output from 16.4 per cent. to the 23.7 per cent., as given in the figures above.

Cable Drum for Lowering Timber

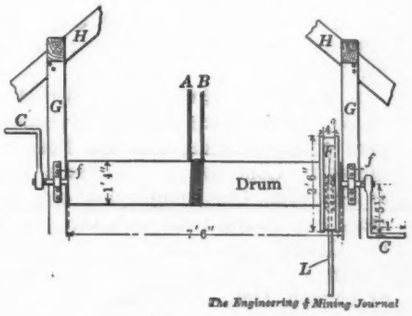
One of the best cable drums for letting mine timber and lagging down a shaft is shown in the accompanying sketches. This form is in use by most of the underground mines of northern Minnesota.

The timber or lagging is loaded on a small car and pushed to the edge of the



Device for Lowering Timbers in Iron Mines

shaft. A double slip noose is placed around the timber and the rear end of the car raised up so the load drops into the shaft. It is allowed to drop slowly down the shaft by the friction band *E*, controlled by the lever *L*. As the rope *A*



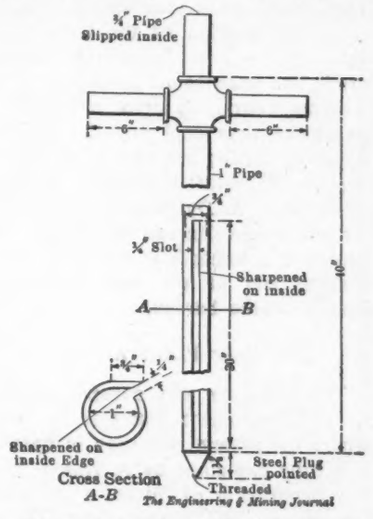
Horizontal Plan of Cable Drum for Timber Shaft

is unwinding, the rope *B* is being wound up and is kept to the side of the shaft by a guide at *M* on the collar of the shaft. The end of rope *B* reaches the collar as the load strikes bottom; and another load is then attached to rope *B*, which again pulls up the unloaded rope with chain.

The drum is of sufficient length to allow for any length of rope. The larger the load handled, more turns of rope are necessary to hold it. A ⅜-in. wire rope is used in most cases and will wear for years. The friction band *E* is made of strap iron 4 in. wide and ¼ in. thick. The shafts are lined with plank placed vertically, so that the bundle of moving timbers does not catch in the shaft timbering.

Sampler for Lead Concentrates

The sampler shown in the accompanying drawing was designed and used by a southeast Missouri lead company for sampling carloads of concentrates. The sampler cuts a core from the top to the bottom of the car and retains the wet sludgy lead at the bottom, thus giving a sample which represents the true moisture and lead percentage of the shipment. The ¾-in. pipe slips inside the outer one and the sampler is thrust to the bottom of the car, either by shoving or hammering the top of this pipe which extends above the sampler proper. The inner pipe is then removed and a few turns given the sampler which causes the



Sampler for Lead Concentrates

sharpened slot to cut an even sample. The sampler is then pulled up and the lead knocked out through the top onto an iron pan. Three rows of four holes each are taken regularly over the car and this entire sample quartered down. The ¼-in. slot in the sampler is made by prying open one edge along a cut. The inside edge of the projecting side of the slot is filed down to a sharp edge.

In advocating overhead stoping as compared with underhand stoping, the *South African Mining Journal* gives as the admitted reason for the prevalence of the latter method on the Rand, "the inability of the majority of the native drill 'boys' to do good work in overhead stopes. It does not appear to us that sufficient attention has been given to the varying abilities of the different natives. However, the human arm has its limitations as a mechanical tool, and it is pretty clear that back-stoping on these fields can best be carried out by machine drills."

The American Peat Society

SPECIAL CORRESPONDENCE

The annual convention was held at Ottawa, commencing July 25, under the presidency of Dr. Eugene Haanel, director of the Mines Branch of the Canadian Department of Mines. About 50 delegates were in attendance, including representatives of the peat industry in the United States, Canada, Great Britain, Brazil and Sweden. Controller Hinchey extended a welcome on behalf of the city of Ottawa, and pointed out the advantages which the community would derive from the development of the peat industry. Among the papers read at the morning session was one by Alex. Dobson, of Beaverton, Ont., on the "History of the Peat Industry in Canada." Among other interesting facts he noted that half a century ago the peat bogs, near Farnham, Que., for a year supplied fuel for an entire division of the Grand Trunk Railway. It was found that owing to crude and uneconomic processes the peat was not thoroughly dried and was more expensive than coal and the producing company failed; but with better methods a profitable industry could be developed. Prof. Chas. A. Davis, peat expert of the United States Bureau of Mines, presented a summary of the work of the Society and of the peat investigation branch of the bureau.

THE PEAT PLANT AT ALFRED

The afternoon was devoted to a visit to the Government peat plant at Alfred, where the system was seen in operation and fully explained by A. Anrep, Jr., of the Department of Mines, a son of the the inventor of the Anrep peat-manufacturing machine. The following figures showing cost were presented:

It costs 80c. per ton to dig the peat, 8c. per 1000 bricks for drying, 15c. per ton for stacking, 10c. per ton for transportation to the storage shed, and 20c. per ton for transport to the railway.

At the evening session Hon. Clifford Sifton, chairman of the Conservation Commission, delivered an address, emphasizing the importance of utilizing the peat resources in view of the rapid exhaustion of the coal and wood supply. Dr. Eugene Haanel spoke of the peat situation in Canada, saying that the methods which had proved successful in Europe were being followed. The Canadian coal deposits were situated in the far East and in the West and the long hauls to the central provinces left the country at present dependent on outside resources for its coal supply. At present no estimate could be formed of the enormous extent of the peat bogs; the 37,000 square miles already known, forming probably only a fraction of the total. The Government plant at Alfred would have 2000 tons of good dried peat by fall, which would be used in the Government gas-producing plants at Ottawa. Its cost on the cars at Alfred would be about $1.60 per ton, and it could be produced more cheaply. Dr. Arthur Mighill, of Boston, read a paper on the "Peat Power Generator."

At the morning session, July 26, officers were elected as follows: President, Dr. Eugene Haanel, Ottawa; vice-presidents, for Eastern States, John N. Hoff, New York; for Great Lakes and Mississippi valley, eastern division, Carl Kleinsturek, Kalamazoo, Mich.; western division, L. B. Lincoln, Chicago; Southern States, Robert Ranson, St. Augustine, Fla.; Pacific States, C. V. Imeson, Los Angeles, Cal.; Canada, Dr. J. McWilliam, London, Ont.; New York section, Dr. Charles T. McKenna, New York; New England section, O. E. Moulton, Dover, N. H.; Minnesota section, Max Toltz, St. Paul; secretary-treasurer, Julius Bordello, Kingsbridge, New York City. Kalamazoo was chosen as the next place of meeting.

L. B. Lincoln, of Chicago, criticized the hand-labor methods of the Government peat plant, claiming that the Peat Engineering Company, which has a plant at Farnham, Que., employing only two men, was makng twice as much peat as the Government plant with 20 hands. Papers were read by Dr. J. McWilliam, of London, Ont., on "Drying Peat," and by Philip Heseltine, of Detroit, on "A Well Equipped Peat Fuel Plant and How to Operate It." In the afternoon the delegates visited the Government fuel-testing plant at Ottawa. In the evening they were entertained at a banquet at the Hotel Victoria, Aylmer, at which the principal speakers were Hon. Sydney Fisher, Dominion Minister of Agriculture; Colonel Foster, U. S. Consul, and Prof. Charles A. Davis.

The Canadian Peat Society was organized in affiliation with the American society, to work along similar lines, with Dr. J. McWilliam, London, Ont., as president; A. J. Forward, secretary-treasurer, with headquarters at Ottawa.

Production and Cost of Michigan Copper in 1909

The accompanying table shows the production and cost of copper as compiled from the reports issued by the companies named. It also gives the tons of ore milled and the number of pounds of refined copper produced per ton of ore from the Lake Superior district.

PRODUCTION OF SOME MICHIGAN COPPER MINES IN 1909.

Name.	Tons Milled.	Production of Copper in Pounds.	Pounds of Refined Copper per Ton Milled.	Cost of Mining and Milling per Ton, Including Taxes.	Total Cost per Pound of Refined Copper.
Ahmeek	406,045	9,198,110	22.7	$1.72	15.48c.
Allouez	253,049	4,031,532	15.93	1.54	13.39
Baltic	814,260	17,817,836	21.88	1.554	7.98
Centennial	196,525	2,583,793	13.15	1.818	15.61
Champion	753,908	18,005,071	23.88	1.804	8.45
Franklin	170,546	1,615,556	9.47	1.941	13.35
Isle Royale	401,280	5,719,015	14.3	1.87	16.64
Mass	139,404	1,723,436	12.36	.....	.....
Michigan	148,172	1,979,305	13.36	.....	.....
Mohawk	819,019	11,248,474	13.73	1.40	11.207
Osceola	1,494,845	25,296,657	16.9	1.36	9.47
Quincy	.....	22,511,984	.....	.....	9.98
Tamarack	689,099	13,533,207	19.6	2.44	14.30
Trimountain	323,408	5,282,404	16.33	2.09	13.89
Victoria	118,605	1,062,218	8.96?	1.22?	17.09?

Quarterly Report of the Nevada Consolidated Copper Company

The statement of the affairs of the Nevada Consolidated Copper Company for the third quarter of the fiscal year ending Sept. 30, 1910, has just been published by the secretary of the company. The production of copper during this period amounted to 18,173,676 lb.: In April, 5,822,351 lb.; May, 6,164,493 lb.; June, 6,186,832 lb. Ore treated during the third quarter averaged 2 per cent. copper as against 1.99 per cent. in the second quarter and 2 per cent. in the first quarter of the fiscal year. The cost of producing copper during the quarter, after writing off for depreciation of the Steptoe plant, is stated as 6.34c. per lb. as against 7.89c. for the preceding quarter.

For the period under consideration a credit of $49,322 is made under liabilities as "metal reserve." This represents the amount received during the quarter for copper in excess of the average of the metal at which profits were figured. The net profit for the quarter is shown to be $401,317 after paying dividend No. 3 amounting to $746,479 and writing off the depreciation of the Steptoe plant to the amount of $132,901.

LIBERTY OREBODY TO BE OPENED

During the time reviewed the board of directors authorized the opening of the Liberty orebody, which should further increase the available ore reserves. The work of installing the necessary tracks and other preliminaries for removing over-burden is stated to be progressing rapidly. This means that the Nevada

Consolidated will now have the Eureka pit, Liberty pit and the Ruth mine as sources from which to draw ore.

Operations for nine months of the fiscal year have resulted in the production of 44,672,084 lb. of copper and a net credit of $317,834 to the surplus account after providing for three quarterly dividends and for depreciation of the Steptoe plant.

All bonds except one of 500-dollar issue have been retired; this has not been presented for redemption. The mortgage securing the bond issue was canceled June 9, 1910. At the date of issuing the report it is stated that 1,270,859 out of a total of 1,300,000 shares of Cumberland-Ely stock have been exchanged for stock in the Nevada Consolidated under the terms of the offer made to the stockholders of the former company last November.

Electric Iron Smelting

The following table showing comparative analyses of the pig iron produced at Heroult in the electric shaft furnace should accompany the article published on page 269 of this issue.

Since that article was written additional information regarding the operation of electric shaft furnaces for smelting iron ore in Sweden and Norway has been published by representatives of the British consular service. It is claimed that iron capable of competing with the best Swedish charcoal iron costing from $24 to $25 per ton is produced for $14.80 per ton in the experimental electric furnace at Tinnfos, near Skien, Christiania fjord, Norway. The daily production is stated as only three tons per day so this figure will doubtless be questioned. It is further reported that an electric steel furnace will be erected at this place. It is also mentioned that satisfactory results are being obtained at Trollhättan and Domnarfvet.

COMPARATIVE ANALYSES OF PIG IRON PRODUCED AT HEROULT IN ELECTRIC SHAFT FURNACE.

Analyst.	General Electric Company.	Detroit Testing Company.	Southern Pacific Company.	W. M. Carr.	J. Crawford.
Si	1.02	0.94	0.98	0.84	1.0
S	0.046	0.042	0.049	0.037	0.042
P	0.025	0.027	0.03	0.022	0.0195
Mn	0.036	0.11	0.08	0.03	.....
Comb. C	1.23	1.20	.....	.....	.....
Graphite	1.68	2.06	.....	.....	1.53
Total C	2.91	3.26	4.56	.....	3.48

Plans are made for an extensive mineral exhibit at the El Paso (Texas) fair in October. Already exhibits valued at $10,000 have been pledged and the smelting and mining companies are actively coöperating with the movement to provide a complete display of the varied mineral resources of the rich tributary country. Charles A. Dinsmore, of El Paso, is in charge of the arrangements.

Calumet & Hecla

The report of the Calumet & Hecla Mining Company for the fiscal year ended April 30, 1910, shows a production of mineral equal to 78,652,618 lb. of copper or 27.44 lb. per ton of rock stamped as against 30.06 lb. for the previous year. On this result dividends amounting to 30 per share or a total of $3,000,000 were paid.

Production of the Several Lodes

Of the total copper produced, the Conglomerate lode yielded 65,361,814 lb. or 32.25 lb. of copper per ton of rock stamped and the Osceola lode, 13,231,769 lb. of copper or 15.85 lb. per ton of rock; as against 35.03 and 17.06 lb. respectively for the previous year. Work on the Kearsarge lode was carried on throughout the year, but only 4800 tons of rock were stamped, yielding 59,035 lb. of copper at a cost of 4.75 cents per pound.

The development work on the Conglomerate and Osceola indicates the average copper content to be about the same as that of the year under review, but the improvements on the latter have effected a decrease in the cost of production and an increase in the capacity of the shafts.

Since Jan. 1 the stamp mills have been treating Tamarack Conglomerate rock while the Osceola rock has been sent to the Tamarack mills, the exchange securing equally good extraction on this grade of rock at no additional expense. The Calumet mills have made a greater saving for Tamarack at a small increase in cost, so that the company expects to eventually benefit through the holdings of Tamarack stock.

New Electrolytic Building Completed

The new electrolytic building at the Buffalo refining works has been equipped and put in operation and one of the old furnaces has been replaced by a larger furnace using a trolley ladle.

The company expended $100,000 in satisfactory exploration on the Nonesuch lands and is now entitled to receive one-half, or about 43,350, of the common shares of the White Pine Copper Company, when the lands are conveyed to that company. In return for further sums advanced to the White Pine Copper Company for development and equipment, Calumet & Hecla is entitled to receive cumulative 5 per cent. shares of stock at par ($25), to be retired out of earnings before dividends are payable on the common stock.

The company subscribed and paid for 19,400 shares of stock at $13 per share of the new Cliff Mining Company which now owns the Cliff lands conveyed to it by the Tamarack Mining Company. Explorations on the Kearsarge lode, which outcrops on these lands for a distance of about 11,000 ft., will be started this summer.

Subsidiary and Associated Companies

The Calumet & Hecla owns the capital stock of the Frontenac Copper Company and a controlling interest in the Gratiot Mining Company, the La Salle Copper Company, the Manitou Mining Company, the Superior Copper Company, the Dana Copper Company, the St. Louis Copper Company, the Laurium Mining Company, and the Seneca Mining Company. It also owns a part interest in the Allouez Mining Company, the Centennial Consolidated Mining Company, the Cliff Mining Company, the Osceola Consolidated Mining Company, the Ahmeek Mining Company, the Isle Royale Copper Company, the Tamarack Mining Company, and the White Pine Copper Company.

The assets for the year were $8,546,706 and the liabilities, $879,408, as against $7,774,107 and $952,338 respectively for the previous year. The capital stock of the company is $2,500,000, in $25 shares, of which $12 per share was paid in.

Utah Copper Company

The preliminary report of the Utah Copper Company for the quarter ending June 30, shows earnings, not including income from Nevada Consolidated, of $1,192,551, which compares favorably with $871,957 for the March 31 quarter, and $596,317 for the December 31 quarter. The cost of production is stated at 7.53c. per lb., as compared with 9.43 for the spring quarter, and 8.48 for the winter quarter.

COPPER PRODUCTION OF UTAH COPPER COMPANY, 1910.

January	4,745,066	April	7,902,643
February	5,913,465	May	8,862,913
March	7,853,288	June	8,358,496
Total	18,511,819		25,124,052

Net earnings for the quarter, including income from Nevada Consolidated, are reported to be at the rate of over $6,000,000 per year, or $4 per share on the outstanding stock, as may be gleaned from the following figures.

The earnings from the company's own operations were $1,192,551, or $1,548,976 net earnings for the quarter, and in addition $356,428 was received from Nevada Consolidated holdings. Dividends of $1,155,243 were paid on 1,5[illegible],

325 shares of Utah stock. The surplus for the quarter amounted to $393,735. The profits for the June quarter were figured on the basis of copper sales at 12½c. per lb., although a little better price was actually received.

Listing of Goldfield Consolidated

The Goldfield Consolidated Mines Company has made application for the listing on the New York Stock Exchange of its capital stock, aggregating $35,591,480 par value of an authorized issue of $50,000,000 par value, representing a capital stock of 5,000,000 shares of a par value of $10 per share. The stock of the corporation is all common stock and carries with it a voting power of one vote per share. It is fully paid and nonassessable and no personal liability attaches to ownership. The company was organized on Nov. 13, 1906, under the laws of Wyoming. Its charter, which expires Nov. 13, 1956, gives the company the customary rights and privileges granted to mining and mercantile corporations.

The established rate of dividend is 30c. per share payable quarterly, but during the fiscal year, 1909, two extra dividend disbursements at the rate of 20c. per share were made. The company has no debt except current accounts. It is an original organization designed to acquire material property and also the stock of other corporations. It had for its immediate purpose the acquiring of the controlling stock interest in the Goldfield-Mohawk Mining Company, the Red Top Mining Company, of Goldfield and the Jumbo Mining Company of Goldfield, and the Laguna-Goldfield Mining Company. Immediately following its organization, it acquired the control of these corporations and of the Goldfield Mining Company of Nevada, and later purchased outright the fee-simple title to the property of the Combination Mines Company.

Subsidiary Companies Acquired

The shares of these subsidiary companies were acquired on the following basis: Mohawk, 1 to 2; Red Top, 2 to 1; Jumbo, 2 to 1; Laguna, 5 to 1 and Goldfield Mining, 5 to 1, of Consolidated stock. The issues of Consolidated stock for these and other purposes were: Exchanged for subsidiaries, $24,977,680; to acquire Combination Mines property, $7,340,710; sales, $723,090; underwriting, $2,500,000; and organization, $50,000. On July 1, 1909, the company purchased outright from the above mentioned five companies the fee-simple title to their property, thereupon dissolving the companies.

The company at present owns the entire authorized and issued capital stock of 4000 shares of the value of $100 each of the Goldfield Consolidated Milling & Transportation Company, a subsidiary organization, which, for administrative purposes, purchased from the Goldfield Consolidated Mines Company a part of its equipment and real estate including all of its milling and transportation facilities.

The charter of the Goldfield Consolidated Milling and Transportation Company, incorporated under the laws of the State of Wyoming, expires on the first day of July, 1959. The parent company also owns 548,835 shares of stock of the C. O. D. Consolidated Mining Company, a corporation authorized under the laws of South Dakota, with a capital of 3,000,000 shares of a par value of $1 each; but the latter company is in no sense a subsidiary company of the former, and the stock thus owned is carried on its book at a nominal figure of 15c. per share.

Total Area of Property is 390 Acres

The physical property of the company consists of 26 patented lode mining claims, as follows: Jumbo, Clermont, Lucky Boy, Grizzly Bear, January, February, Mohawk No. 1, Mohawk No. 2, Slim Jim Fraction, Miss Jessie, Laguna, Last Chance, Red Top, Little Red Top, Combination No. 1, Combination No. 2, Combination No. 3, Side Line Fraction, O. K. Fraction, Rustler Fraction, Hazel Queen, Golconda, Wonder, Red Boy, Mammoth and Goldstone; and one unpatented lode claim.

The company has a total area of 390 acres, together with mining machinery and plants, consisting of hoists, compressors, stores, etc. All of this property is contiguous and is situated in the Goldfield mining district, Esmeralda county, Nev. The company states in the report that "it has extended its development work to an extent that reveals an estimated ore tonnage exposed of 800,000 tons, with an unexplored and partially explored acreage so great as to give assurance of future development of orebodies adding greatly to the life and productiveness of the property."

During the fiscal year, 1909, 40,668 ft. of development work were performed, of which 27,469 ft. were driven on company account and 13,199 ft. by lessees. The Combination, Mohawk, Red Top and Clermont shafts have been under continuous operation. Development work has been generally successful in opening up additional ore in the newly developed portions of the older levels of these mines as well as in the new deeper levels driven from the Clermont shaft.

Recovery on Ore Was 92.5 Per Cent. in 1909

During the six months ended April 30, 1910, development work on the property amounted to a total of 20,344 ft., costing per foot an average of $9.12. The ore production for the fiscal year ended Oct. 31, 1909, amounted to a total of 194,479 tons, yielding an average of $37.98, representing a gross value of $7,386,450. From this a recovery of 92.5 per cent. was realized or net returns of $6,832,652. This was accomplished at a mining, milling, transportation and general expense of $4.83 per ton and a development expense of $1.94 per ton, making a gross operating expense of $6.77 per ton.

In December, 1909, a departure from the company's method of reporting costs was made, whereby in addition to the cost of operation, all costs, including construction and losses in tailings, are shown. This system bought the cost and loss per ton from $6.92 in November, 1909, up to $12.17 for December.

For the six months ended April 30, 1910, the entire property produced a total of 129,000 tons of ore, having an average value per ton of $40.61 and yielding a gross value of $5,238,767.

The detailed profit and loss account, as well as the assets and liabilities of the Goldfield Consolidated Mines Company, and the Goldfield Consolidated Milling and Transportation Company, were given in the JOURNAL of Jan. 22, 1910. In accordance with the rules of the stock exchange, the company agrees that it will not dispose of its interests in any constituent company, or allow any of said companies to dispose of its interest in other companies except on direct authorization of the stockholders; and further that it will not speculate in its own or constituent companies' securities, or permit similar speculations by any of its constituent companies. A detailed statement of its physical and financial condition will be published yearly.

Production of Nevada County, California

County Surveyor Fred M. Miller, of Nevada county, Cal., at a convention of county committees at Nevada City, presented an able paper on the mines of Nevada county. He figures that the county has produced altogether in gold, from both quartz and gravel mines, $260,000,000. Of this he figures that $90,000,000 came from Grass Valley district alone. He states that the yield per mile from the upper gravel of the hydraulic mines is estimated at $2,000,000 to $3,000,000, and the yield per linear foot of the drift mines at $100 to $500. The records of individual hydraulic mines show the washing of from 2,000,000 to 47,000,000 cu.yd., with yields from 5c. to 13c. for top gravel and as high as 35c. and 40c. from the gravel banks at North San Juan and French Corral. The North Bloomfield mine produced $5,000,000 from gravel yielding 4c. to 10c. per cu.yd. and it is estimated that in this property there remains $35,000,000 yet to be extracted, though the mines are closed by Federal laws.

British Columbia Mines and Minerals

BY E. JACOBS

The report of William Fleet Robertson, provincial mineralogist, for the year 1909, gives the later and corrected reports of production, for which estimates were given earlier this year. Table I gives the output in quantities and values, with the changes in value as compared with the 1908 report. The report is now almost ready for issue.

TABLE I.

	1909. Quantity.	Value.	Changes in Value.
Gold, placer ....Oz.	.....	$477,000	D. $170,000
Gold, lode .....Oz.	232,224	4,924,090	D. 358,790
Total gold	.....	$5,401,090	D. $528,790
Silver...Oz.	2,532,742	1,239,270	D. 82,213
Lead....Lb.	44,396,346	1,709,259	I. 76,460
Copper.. "	45,597,245	5,918,522	D. 321,777
Zinc..... "	.....	400,000	I. 130,000
Total metals..	.....	$14,668,141	D. $726,270
Coal..lg. ton	2,006,476	7,022,666	I. 1,150,194
Coke.. "	258,703	1,552,218	I. 67,824
Other materials.....	.....	1,200,000	I. 100,000
Total.....	.....	$24,443,025	I. $591,748

The value of copper last year exceeded that of gold; and this was also the case in 1908. Coal and coke together were 35.1 per cent. of the total values.

Table II gives the value of the production of all kinds in 1909, by districts, and by the subordinate mining divisions of the more important districts.

TABLE II.

	1908.	1909.
Cariboo District:		
Cariboo	$355,000	$220,000
Quesnel	30,000	12,000
Omineca	20,000	15,000
Total Cariboo	$405,000	$247,000
West Kootenay District:		
Ainsworth	$442,181	$617,340
Nelson	462,836	584,955
Slocan	676,580	954,737
Trail Creek (Rossland)	3,713,392	2,875,084
Other divisions	173,235	137,633
Total West Kootenay	$5,448,224	$5,169,749
Yale District:		
Osoyoos, Grand Forks and Greenwood	$7,545,380	$7,501,046
Similkameen and Nicola	101,583	225,210
Yale division	3,000	2,000
Total Yale	$7,649,963	$7,728,256
Cassier district	298,234	234,498
East Kootenay district	4,802,680	4,768,216
Lillooet district	13,779	16,676
Coast district	7,649,963	7,728,256
Total	$23,851,277	$24,443,025

The Coast districts include Nanaimo, Alberni, Clayoquot, Quatsino and Victoria. These districts showed a considerable increase last year; these and the Yale district were the only ones which reported gains, except the Lillooet, the total of whose production is very small. In the West Kootenay the chief loss last year was in the Trail Creek, or Rossland division.

Table III gives the total mineral production of the Province from the earliest date reported up to the end of 1909, as follows, in values:

TABLE III.

	Total Value.	Per Cent of Total.
Placer gold	$70,673,103	20.3
Lode gold	55,277,687	15.9
Total gold	$125,950,790	36.2
Silver	29,850,586	8.6
Lead	23,259,255	6.7
Copper	55,871,893	16.0
Other metals	890,699	0.3
Total metals	$235,823,223	67.8
Coal and coke	102,904,261	29.6
Building stone, clay, etc.	9,093,100	2.6
Total	$347,820,584	100.0

Gold has been the leading item in value of the production, coal holding the second place. Of the metals outside of gold, copper shows the greatest value.

A summary of the comments on the output of the year follows:

Progress of Mining

The value of the mineral products of the province for 1909, while less than that of 1906 and 1907, is still considerably greater than that of any previous year.

The ore mined, exclusive of coal, was 2,057,713 tons, a decrease from 1908 of 25,893 tons, or 1.2 per cent. This tonnage was produced by the various districts in the following proportions: Yale district, Boundary mines, 71 per cent.; West Kootenay district, Rossland mines, 11.6 per cent.; East Kootenay district, mines in Fort Steele division, 7.3 per cent.; Coast district, 1.9 per cent.; all other parts, 8.2 per cent.

The number of mines from which shipments of ore were made was 89, and of these only 52 shipped more than 100 tons each during the year, while but 32 shipped in excess of 1000 tons each. Of the latter, eight were in Nelson mining division, five in the Boundary, five in Ainsworth division, four in the Slocan district, three in the Coast district, three in Trail Creek (Rossland) division, two in Fort Steele division, and one each in Trout Lake and Queen Charlotte divisions.

The number of men employed was: In metalliferous, producing mines, 3037 (2048 below and 989 above ground); in mines not shipping, 217 (136 below and 81 above ground); total, 3254. A mine employing say 12 men for four months was credited with an average of four men for 12 months, so that the total above given is less than the actual number of men who worked in the mines during the year. The number employed at the coal mines was 6418, including 215 white boys, and 672 Chinese, Japanese and Indians. The official figures of all employed at the mines of the province, therefore give a grand total of 9672.

Coal

The coal produced was mined chiefly by three companies, the Wellington Colliery Company and the Western Fuel Company, both on Vancouver island, and the Crow's Nest Pass Coal Company, in southeast Kootenay; these companies together produced about 88 per cent. of the total coal mined. Of the smaller collieries, those on Vancouver island were the Pacific Coast Coal Company's mines, with about 70,000 tons, and the Vancouver-Nanaimo, 10,000 tons; in Nicola valley the Nicola Valley Coal and Coke Company, 62,000 tons, and the Diamond Vale Company, 1700 tons; in the Crow's Nest district, the Hosmer and Corbin collieries each produced about 60,000 tons. The gross output of coal was 2,400,600 tons (of 2240 lb.), of which 998,494 tons was sold for consumption in Canada, 741,646 tons exported chiefly to the United States; 260,554 tons burned under colliery boilers, etc.; 394,124 tons used in making coke, and 5782 tons added to stock. The quantity of coke made was 258,703 long tons, of which 210,884 tons was for consumption in Canada; 40,620 tons exported, nearly all to the United States, and 7199 tons added to stock. The production of coal was the largest for any year since coal mining was commenced in the province; that of coke was second only to that of 1905, when 271,785 long tons were made.

Gold

Production of placer gold was $477,000, as against $647,000 in 1908, and this was the smallest amount of any year since 1894. The decreased output was attributable partly to the short water supply last season. The value of lode gold was $4,924,090, a decrease of $358,790 as compared with 1908. Nelson, Boundary, and Coast districts each produced more lode gold, but the decrease in Rossland camp was large. About 86.5 per cent. of the lode gold was recovered from smelting ores also copper-bearing; the remaining 13.5 per cent. was from stamp milling, etc. The stamp mills operated last year were those of the Hedley Gold Mining Company, at Hedley, Similkameen, 40 stamps; Granite-Poorman mill, 20 stamps, near Nelson; Queen mill, 20 stamps, at Sheep Creek, Nelson division, and one or two very small mills also in the last-named camp.

Silver

The silver produced totaled 2,432,742 oz., a decrease in quantity of 98,647 oz. and in value of $82,213, as compared with 1908. About 98 per cent. was from silver-lead ores and the remainder from copper-silver ores. The Slocan district—including Ainsworth, Slocan, Slocan City and Trout Lake divisions—produced about 50 per cent. of the total, and Fort Steele division of East Kootenay 23 per cent., all from argentiferous galena ores.

Lead

Lead showed a production of 44,396,346 lb., this being an increase of 1,200,613 lb. in quantity and $76,460 in value over that of 1908. Mines in Fort Steele division (chiefly the St. Eugene) produced nearly 61 per cent. of this total; those in Ainsworth and Slocan, 34 per cent., and in Nelson and Trout Lake divisions, 5 per cent.

Copper

The copper, placed at 45,597,245 lb., was less in quantity by 1,677,369 lb., and in value by $321,727, than in 1908. These figures do not take into account smeltery charges or deductions, but show the copper contained in the ore smelted. There was a slight increase in the Boundary district and Nelson division, but a heavy falling off in Rossland division and the Coast district. The proportions of production of districts were: Boundary 89 per cent., Rossland 7.7, Coast 2.8, and Nelson 0.4 per cent.

Iron, Zinc, Etc.

No iron ore was shipped and very little mined, there having been no market in 1909 for iron ore from the province. About 10,000 tons of zinc ore and concentrates were sold in 1909, the zinc contents ranging from 38 to 48 per cent. The Lucky Jim was the only mine that shipped zinc ore; it sent out 4700 tons averaging 48 per cent. zinc. The Whitewater group, Ainsworth division, produced 4600 tons of zinc concentrates, also containing from 15 to 25 oz. silver to the ton. Mills of other mines also produced zinc concentrates, but little of that production was sold.

Building Materials

In building materials, etc., the chief production was in granite and sandstone, bricks, pottery and portland cement. Of the last 238,000 bbl., valued at $360,000, were manufactured on Vancouver island.

Prominent Features

Besides the statistical tables and accompanying comments the provincial mineralogist gives some accounts of his personal observations in several mining districts—Queen Charlotte islands; the coal-mining district in the Crow's Nest country, in which there has been much development and production; the important though undeveloped coal areas in the upper Elk river district, computed by D. B. Dowling, of the Geological Survey of Canada, to have an area of 140 square miles, and a probable workable coal content of 100,000,000 tons per square mile; the metalliferous mineral region in East Kootenay lying between the Canadian Pacific main line, to the north, and the Moyie Lake district, along the Crow's Nest branch, to the south; and the Duncan River district and Sheep Creek camp, both in West Kootenay.

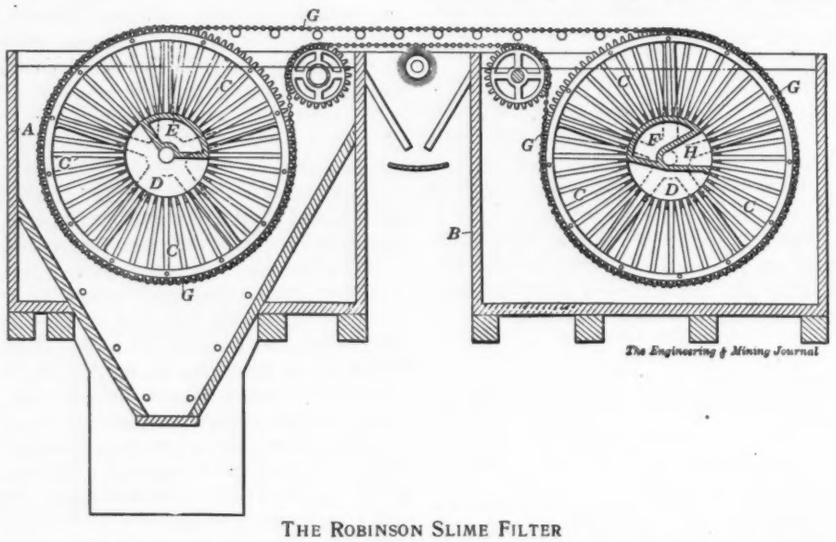
Several official reports on the explosion at Extension colliery, Vancouver island, in which 32 men lost their lives last October, and diagrams, etc., also form part of the report.

Halftone reproductions of photographs are numerous, and some of these are of especial interest, since they illustrate mining and other scenes not previously used. Altogether, the report is an excellent one, giving a comprehensive review of the mineral resources and operations.

The Robinson Slime Filter

The accompanying illustration is a section of an apparatus having for its objects the filtration and the washing of the pulp economically and quickly. The filter has been patented (U. S. Pat. 954,466, April 12, 1910) by Cyrus Robinson, Mount Vernon, N. Y.

The tank *A* contains the slime solution and another *B* the water for washing the cake of pulp. In both tanks are drums



The Robinson Slime Filter

on the peripheries of which are fastened wooden blocks forming recesses from which pipes *C* lead to chambers *D*, the chambers having valves *E* and *F*. Outside of the blocks is the filtering material with its outer edges attached to chains *G* running over sprocket wheels on the drums. If the pump or vacuum be connected to the valve chamber in tank *A*, the solution will flow through the filtering material, and the slime or pulp will be deposited on the filter. The valve *E* closes communication between the recesses on the portion of the drum not submerged and the valve chamber which acts as the constant sector of the drum cutting off the vacuum action.

The drum in tank *B* is similar to the one in *A*, except the former has a double valve *F*. This valve permits two washings of the pulp, the first washing passing through the small port and out of a passage opposite *H*, and the second through the passage *H* and the hub.

Scottish Oil Shale Industry

Practically all of the Scottish mineral-oil companies have been extending their productive capacity, and two of them, the Pumpherston Oil Company and the Oakbank Oil Company, are just completing extensions which represent the doubling of the plant.

Prospecting work has resulted in the discovery of extensive deposits of shale, as rich as anything that had ever been worked, close to the producing works. Last year the output of shale was nearly 3,000,000 tons, and the deposits are sufficient to insure supplies for many years to come. According to *Chem. Trade Journ.*, Apr. 30, 1910, the average yield of oil per ton of shale may be taken at 23 gallons, and on that basis the total output last year was over 68,000,000 gal. Out of this the Scottish companies obtained about 22,000,000 gal. of lamp or burning oil, which sells at from 5½d. to 6d. per gal.; 4,000,000 gal. of motor spirit, at from 10d. to 1s. 1d. per gal.; 40,000 tons of gas or intermediate oils, at 2½d. to 3d. per gal.; 40,000 tons of lubricating oils, at £4 10s. to £6 per ton, according to gravity and quality; 60,000 tons of sulphate of ammonia, selling at £12 10s. per ton; and 25,000 tons of solid paraffin wax, at from 2d. to 2½d. per pound.

Conditions at the Palmilla Mine, Parral, Mexico

Primary Ore in Faulted Andesitic Intrusive. Development from Two Main Shafts on Six Levels. Electrical Equipment Being Perfected

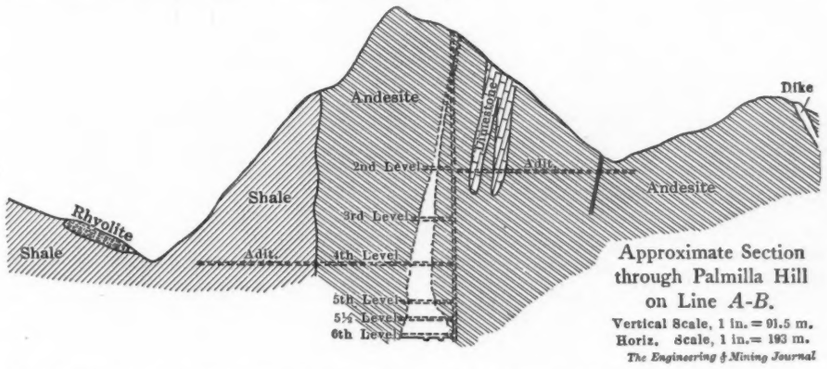
BY FRANKLIN W. SMITH*

At intervals during the last 10 years the Palmilla mine, near Parral, Chihuahua, Mex., and its former owner, Don Pedro Alvarado, have received attention from the Sunday supplements and many grotesque yarns about them have been printed. Frequently, no doubt, a careful panning of this material would reveal a very small color of truth, but essentially these yarns are—just yarns, with one exception, for the mine really has been a great producer, yielding not only wealth to its owner, but much "easy money" to beneficiaries of stolen ore. And ore was stolen, not bit by bit, but literally by the burro-train load. All estimates of production are only guesses, but allowing for the money Alvarado is known to have spent and invested, what he is reasonably believed to have squandered and given away and for the cost of his liberal policy toward ore thieves, it seems reasonable to place the gross production at about $7,000,000 in gold. And that, surely, is a commendable record for one ten-acre claim.

History of the Property

The ground was owned by Alvarado's father, who prospected it with little success. Dying with faith in it undiminished, he is said to have exacted from his son a promise that he would never sell it. The portrait of the old man in the "grand room" of Alvarado's house shows an intelligent and interesting face. Don Pedro, after a period of prospecting, found the crest of the rich orebody at a depth of about 100 ft. Then came the seven years of plenty which ended when the shaft reached water level at 600 ft. Two years of unskilled attempts to handle the water problem left Alvarado financially embarrassed and ready to deal. First, he leased the mine to certain Americans, then sold it outright to the Alvarado Consolidated Mines Company, that they had formed. During the past year the mine has been reëquipped and put in shape for a vigorous and economical development campaign.

Parral, in southern Chihuahua, on a branch of the Mexican Central, is 56 miles from Jimenez, on the main line. The mine is two miles northwest of town and a mile from the narrow-gage Parral & Durango railway. The property consists of eight claims, of which the Palmilla of 10 acres has been the producer, although other claims are not without surface showings. In addition, the company owns surface and tunnel rights protecting its compressor plant and two adits.



Approximate Section through Palmilla Hill on Line *A-B*.
Vertical Scale, 1 in. = 91.5 m.
Horiz. Scale, 1 in. = 193 m.
The Engineering & Mining Journal

Ore Occurs in Andesitic Intrusion

The ore occurs in fissures and fracture zones in a large intrusion of andesite in shale. The veins are numerous and ramifying and have a northerly strike. The orebodies that gave fame to the mine are two large nearly vertical chimneys in the Palmilla vein, formed by silicification and mineralization of intensely crushed andesite, where ramifying fractures tend to focus. North and south of these big shoots the vein is comparatively narrow and of low grade.

The oldest formation in place is the shale, probably of Cretaceous age, that forms the general country rock to the south and west of the mine, and is exposed for a large part of the distance along the road to Parral. Except near intrusive contacts, the prevailing strike is northeasterly and dip northwesterly 30 to 50 deg. The shale outcrops close to the southern foot of Palmilla hill and half way up on the west flank. The contact with the andesite is approximately vertical.

Limestone and quartzite occur in isolated blocks or reefs floated up by the intrusive andesite, so that their true relation to the shale is obscured. The most notable of these masses forms the "spar vein," a long reef of crystallized limestone parallel with the lode about 500 ft. east of it, dipping westerly 75 deg., as roughly sketched on the cross-section. Where cut by the second-level adit, it is in two parts separated by what appears to be a completely decayed rib of andesite. The contacts are indistinct and the reef grades from black coarsely crystallized calcite at its margins to fine-grained crystallized limestone in the center. It is not believed to be of any significance in connection with the lode.

Igneous Rocks

The igneous rocks are of several varieties and probably of two main periods of activity. In the first, the shale was cut by large intrusions of andesite porphyry which caught up and floated in their mass shale, limestone and quartzite in blocks of various sizes. The second period seems to have been accompanied or preceded by much shearing and intense local crushing of the andesite, which was then cut by quartz porphyry and granite-porphyry dikes and covered by rhyolite flows, now largely eroded. It is believed that mineralization was connected with the second period of activity.

Whether there are several distinct areas of andesite, or whether the occurrences noted are lobes of a large irregular mass was not determined. In the present connection interest centers in the southern end of one lobe, Palmilla hill. To the south and west is shale; to the north and east the limits of the andesite were not determined. At a distance from the ore zone the rock is a moderately fine grained, andesite porphyry. In the mine the country rock is on the whole finer grained, more acid, but of the same type. In places in the lower levels on the west side of the lode, the rock is coarser and more acid, belonging to the intermediate group of monzonite porphpry. Near the lode it assayed 0.04 oz. gold and 4.24 oz. silver. The alteration zone of the andesite near the lode is of propylitic nature. The structural relation of the monzonite to the andesite is obscure. The rock close to and in the lode is fractured and crushed to a great degree. Under the microscope it looks like an igneous fragmental and "contains pieces of porphyry showing flowage and on the whole the structure is more like a tuff or flow breccia than a crush zone." It is a crush

*Mining engineer, Bisbee, Ariz.

zone, however, for the main andesite mass is intruded in the shale and is not a flow.

Intense Shearing Evidenced

After the cooling of the andesite there was intense crushing and shearing with dominant north and south trend. Palmilla hill was the center of this action. It is traversed by shearings that apparently tend to focus in the two great orebodies, which are rich chimneys formed by the silicification and mineralization of the crushed andesite. The veins are continuous, but in the hill have many branches.

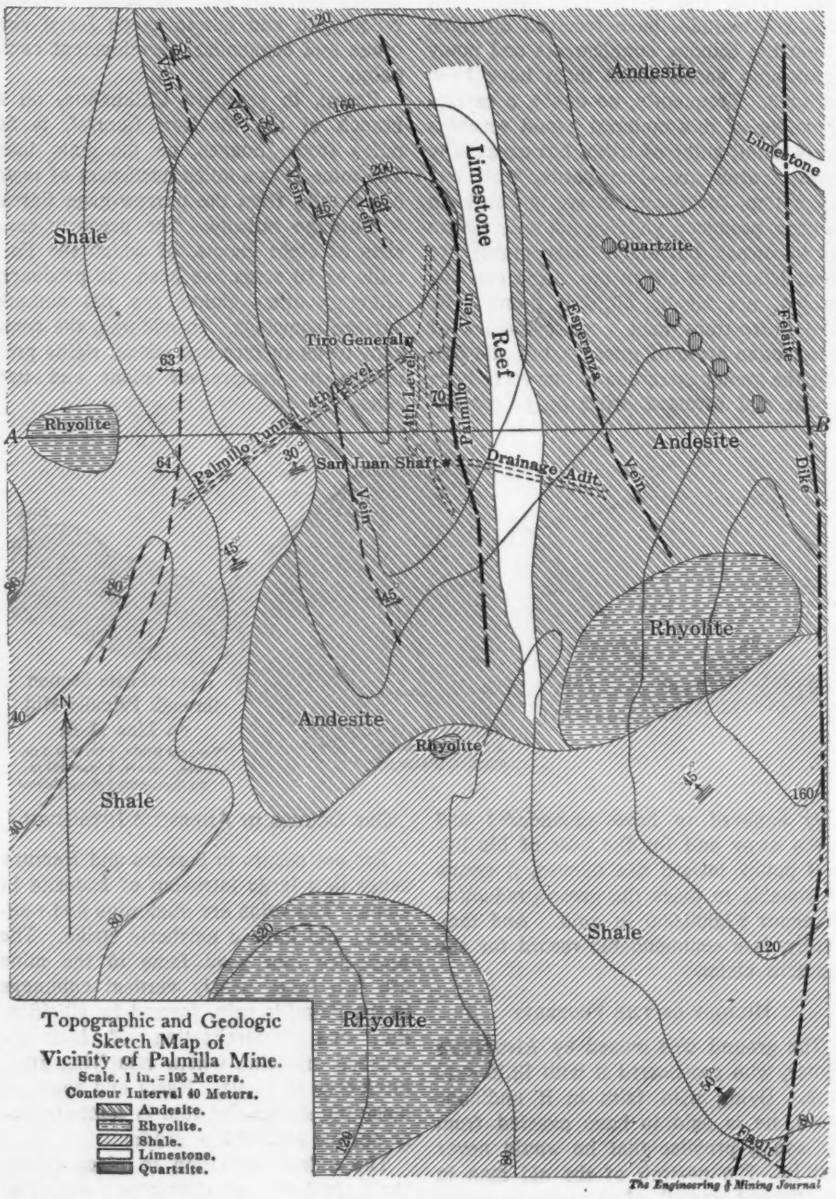
Beyond, to the north, the Palmilla vein can be traced for a mile or more; to the south it is soon lost in the shale. Outside the Palmilla claim there does not appear to have been any such intense crushing. The veins, where explored beyond the oreshoots, are from two to six feet in width and of medium or low grade, frequently below milling grade. Most of the ramifications that outcrop on top and on the west side of the hill appear to die out before reaching the *arroyo* at the base of the hill on the north or the shale on the south. There are other strong parallel lodes, some of them outside the limits of the property. Most of them have been explored, but information about results is not at hand.

Faulting Accompanied Igneous Activity

It is believed that the faulting and crushing took place before or at the time of the second period of igneous activity. The signs of this time are: Rhyolite flows, remnants of which cap the shale to the southeast, south and west of Palmilla hill; the strong felsite dike that can be traced for a mile and a half north and south, 1000 ft. east of the lode; minor, quartz-porphyry dikes cut in the upper levels; and the granite porphyry shown in the diamond-drill cores from holes below the south orebody. That the latter has some connection with the origin of the ore seems probable. The granophyres or granite porphyry dikes in the heart of the south orebody show no brecciation.

Ore Stoped on Six Levels

The orebodies do not outcrop and they have widened steadily from their crown to the sixth level. The barren-vein outcrop just north of the San Juan shaft is shown in an accompanying illustration. Judging from the level plans and from the trend of stoping, there was but one shoot on the first and second levels. On the second, the stope is 260 ft. long and 15 to 20 ft. wide. Between the second (250-ft.) and third (360-ft.) levels, the shoot divides and on the third the north shoot is stoped 70 ft. long and 15 ft. wide; the south one 250 ft. long and 20 to 35 ft. wide. A third small shoot to the south has a narrow stope on it down from the second level. On the fourth (437-ft.) level the north shoot is stoped 140 ft. long and 30 to 80 ft. wide; the south, distance 175 ft., is 190 ft. long and 35 ft. wide, with another stope 30 ft. to the west, parallel, 100 ft. long and 20 ft. wide. On the fifth (515-ft.) level the stopes are more irregular. The north stope is 110 ft. long, 10 to 90 ft. wide, with another small stope to the west. The south stope, distance, 175 ft., is 230 ft. long and 15 to 70 ft. wide. On the 5½ level the north stope is 150 by 50 to 60 ft.; the south 130 by 40 to 90 ft. On the sixth (578-ft.) level, the north shoot is stoped 130 ft. long and 15 to 70 ft. wide; the south, 240 ft. away, is 150 ft. long and 40 to 100 ft. wide. An underhand stope on the north shoot still has good ore in the east wall. The original water level was 18 ft. above the floor of the sixth level. In the geologic and topographic sketch map the shoots are shown in approximate position and outline.



Topographic and Geologic Sketch Map of Vicinity of Palmilla Mine.
Scale. 1 in. = 195 Meters.
Contour Interval 40 Meters.
Andesite.
Rhyolite.
Shale.
Limestone.
Quartzite.

The Engineering & Mining Journal

Orebodies Dip Steeply

The strike of the vein is north 5 to 20 deg. west. The shoots are practically vertical with no appreciable pitch north or south. From the surface to the third level the shearings dip westerly 50 to 60 deg.; between the third and fourth they are vertical; below the fourth they dip easterly 50 to 75 deg. The shoots appear to widen in the direction of the dip of the shearing.

One Period of Mineralization

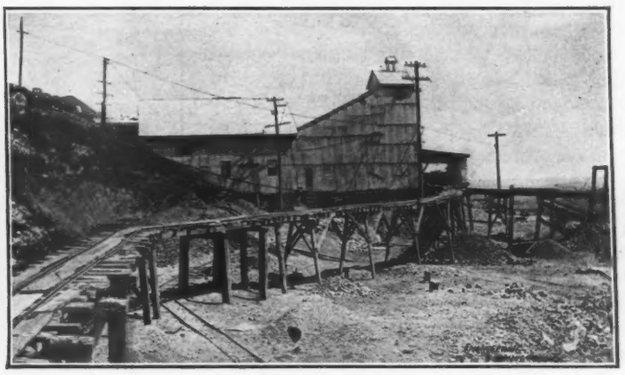
Microscopic examination of ore of various grades indicates but one period of mineralization. A piece of medium-grade ore from the third level south, assaying about 30 oz. silver and $3 in gold, was reported on as "a crushed porphy-

ritic type, probably an andesite and thoroughly silicified. Secondary silica occurs both as quartz and chalcedony. Fluorite is rather plentiful and sulphide mineralization accompanied these impregnations. There appears to be no evidence of more than one period of mineralization." In a hand specimen the ore shows banding. Irregular bands of chalcedony ¼-in. or less thick, are separated by threads of glassy quartz. In certain bands galena is plentiful in very small crystals; in others no metallic minerals appear.

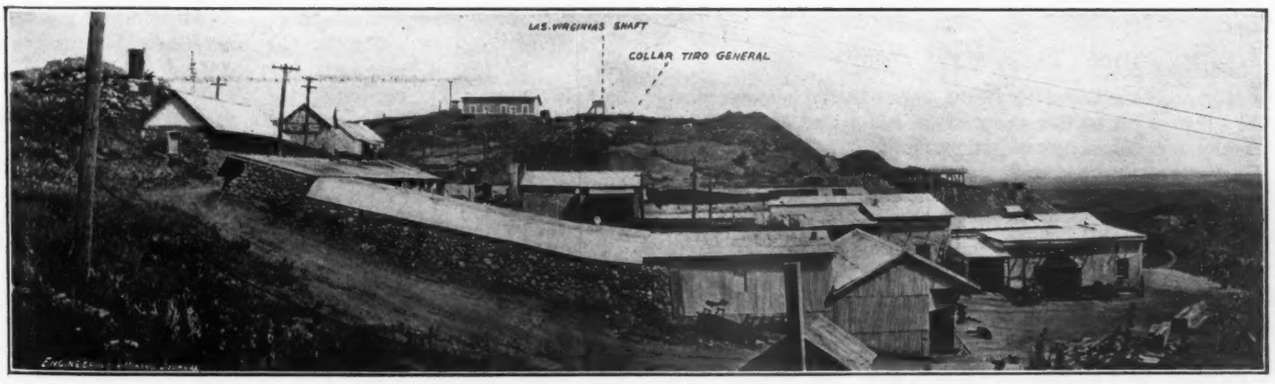
SAN PEDRO SHAFT (ALVARADO)
SAN JUAN SHAFT (ALVARADO)
SAN FRANCISCO SHAFT
ALVARADO POWER PLANT AND MOUTH OF 2ND LEVEL ADIT.
ENGINEERING & MINING JOURNAL

LOOKING NORTHWEST AT PALMILLA HILL NEAR PARRAL, CHIHUAHUA, MEX.

SORTING PATIO AND TERMINAL OF AERIAL TRAM



SAN JUAN SHAFT HOUSE



LOOKING NORTH TOWARD MINE OFFICE, PALMILLA HILL.

MINERALOGIC DESCRIPTION OF ORE

Ore of a better grade, running 67 oz. silver and 0.70 oz. in gold from an underhand stope below the lowest level is thus described: "It is very silicious, of gray color and dense close grain; of medium to very fine texture, interlocking grains of quartz chiefly, with scattering crystals and aggregates of sulphide. The sulphides are all simple pyrite, with no trace of secondary enrichment. The arrangement of coarser and finer areas indicates brecciation with thorough silicification and cementation of the whole mass.

"The association is such as to indicate that mineralization was contemporaneous with the silicification that cemented the brecciated mass, and especially with the later stages of this process, for the sulphides are more abundant in the streaks that represent crevices or fracture lines, but they are also present in other portions of the rock.

"Some of the supposed original fragments exhibit an arrangement resembling porphyritic texture and this is believed to be the character of the original rock, i.e., a porphyritic andesite of rather fine grain. The steps then, are: (1) A porphyritic rock; (2) crushing with brecciation; (3) silicification with perhaps additional movement; (4) mineralization beginning in the silicification of the fragments and somewhat stronger in the closing stages of silicification which ended by (5) final cementation of all fractures."

Ore of a higher grade from below water level, assaying 4.12 oz. gold and 310 oz. silver, was of a similar appearance. It is described as follows: "Metallic mineralization accompanied the silicification and includes pyrite and a very dark gray mineral, both abundantly developed, and a light gray one mixed in

rather small amount. Of these the yellow pyrite seems to have come in first. The dark metallic constituent surrounds the pyrite and penetrates it in occasional places. But all are of early origin and none later than the final silicification.

"The very latest stage, represented by a few veinlets, introduced some additional minerals, such as garnet and fluorite. These emphasize the conclusions that all the mineralization dates back to the general period of silicification and that in all probability this period was connected with some igneous activity in the neighborhood, which was also the source of the mineralization.

"There are also some streaks of metallic constituents that clearly follow cracks that are now wholly healed, and in so far there has been some shift of constituents subsequent to the original development. But this is a rather insignificant portion of the whole, which does not differ mineralogically, and there is a far larger amount that clearly has not been affected at all by the latter crevicing and readjustment." In this connection the presence of the garnet, usually the product of contact or regional metamorphism, is of particular interest. In commenting on it, Dr. Walter Harvey Weed said that he knew of no record of its occurrence under similar conditions.

These detailed descriptions of the characteristics of the ore are quoted from the letters of Dr. Charles P. Berkey, of the Columbia School of Mines. The character of the ore is of interest, since it tends to show that the rich orebodies that have made the mine famous do not owe their value to processes of secondary enrichment, but are bodies of primary ore. There seems to be no reason why the oreshoots should not maintain depth.

Not a High Grade Mine

It is probable that even in the days of the greatest production the average run-of-mine ore was not of sensational grade. There were bunches and stringers that were very rich, running 10 to 15 oz. gold with high silver contents, but probably the average value of all the material stoped did not exceed 40 oz. silver and $5 to $8 gold. There appears to be an increase in the proportion of gold as depth is gained. The value ratio varies greatly. In 100 samples, the ratio of gold and silver ranged from 1:9, to 11:1, but the average was between 1:1 and 1:2. The contents of the ore varies abruptly and through wide limits in short distances. As yet there has been comparatively little crosscutting, but what there is indicates that good milling ore may be found across a width of 100 to 150 ft. and perhaps more, though not necessarily continuous over the whole width, for in the shoots there are some barren spots.

Development and Equipment

The accompanying illustrations show the configuration of the country, the appearance of the mine plant and the dump which contains a large tonnage of low-grade ore. There are eight shafts on the Palmilla claim, only two of which are important. The San Juan shaft, sunk on the east side of the south orebody, is the present main-working shaft, and is equipped with a 50-h.p. Denver Engineering Works electric hoist. Its sump extends 30 ft. below the sixth level. Tiro General, which is to be the main shaft below the fourth level, is sunk on the west side of the north orebody. On the 400 a double-track adit 1100 ft. long has been driven to the station from the west side of the hill. Below this level the

Outcrop of Palmilla Vein

three-compartment shaft is being carried down about 7x20 ft. outside the timbers.

In October, 1909, the bottom was 182 ft. below the sixth level. Little work has been done below this level, since it had been necessary to wait for more complete pumping equipment as the Tiro General makes about 800 gal. per min. and the San Juan about 400. At the San Juan a four-stage centrifugal pump, made by the Buffalo Steam Pump Works, driven by a 155-h.p. General Electric synchronous motor, has been giving great satisfaction for over six months. The water is clean and not acid, and the pump shows a high efficiency. Two more have been ordered for the Tiro General. Formerly water was discharged through an adit from the east on the second level. This has been superseded by use of the fourth-level adit.

Despite the high cost of power purchased from a local steam-electric plant, the policy has been toward the use of electric power wherever possible as being more economical and in general more satisfactory. It is understood that a large plant soon to be erected will generate power for the mine and the new mill. The first 250-ton unit of the latter is in process of construction. The plans provide for increase to a capacity of 1000 tons a day.

The country is firm and the great open stopes stand safely without filling or timber. The wage scale is higher than in the camps of central and southern Mexico. Miners receive 1.75 pesos; muckers, 1; blacksmiths, 4; Mexican pumpmen, 2 to 2.50; hoistmen, 2.50 to 3.25; machine men, 3 to 3.50; machine helpers, 2.50; and timbermen, 2 to 2.50 pesos per day.

Zinc Shipments from Mexico

In the following report from Chihuahua, U. S. Consul L. J. Keena describes the advantages of sending zinc ores from Mexico to Europe for smelting rather than to the United States.

The second week in March two consignments of zinc ore were sent from this district to Germany, via Tampico, and on the basis of the returns from these shipments it is probable that a considerable portion of the zinc ore mined in this district will be marketed in England and Germany. The freight tariff of the National Lines of Mexico, which went into effect Dec. 23, 1909, has made it slightly more profitable to ship zinc ore to European points by way of Tampico than to send it to the Kansas smelters by El Paso, Tex. The rate on zinc ore from Chihuahua to El Paso was raised from $1.89 to $2.97 per ton, while the rate from Chihuahua to Tampico was lowered from $4.87 to $4.60 per ton.

That increase of $1.08 in freight cost on shipments to the United States, when augmented by the duty into the United States of 1c. per pound on the zinc contents of ore containing 25 per cent. or more of zinc, gives European markets a small advantage in buying in this district. The maximum freight to ports in England or Germany is $7.60 per ton—$4.60, Chihuahua to Tampico, and $3, Tampico to England or Germany. The ocean charge may often be as low as $2 per ton, when the ore is taken on as ballast or in default of a return cargo.

To deliver Chihuahua ore to the Kansas smelters costs $7.20 per ton—$2.97, Chihuahua to El Paso, Tex., and $4.23, El Paso to the smeltery. The brokerage charges at the United States border are higher than the same charges on zinc ore sent to England or Germany, owing to the contents of this ore being dutiable in the United States.

Basic Lined Converters for Leady Copper Mattes

Under Careful Operation Basic Linings Successful. Fumes Filtered through Woolen Bags; Gas Dilution Checked H_2SO_4 Formation

BY REDICK R. MOORE*

The application of the converting process to concentrated lead-copper matte was given a setback and greatly delayed by the results of experiments referred to by Peters[1]. He says "In treating concentration matte from lead-silver blast furnaces with approximately 40 per cent. copper and 15 per cent. lead, the loss in silver was something incredible—reaching "the preposterous figure of 50 per cent. of the total silver in the matte."

At Aguascalientes in their earlier operations small amounts of lead appeared in the copper mattes and as no notable silver losses occurred it was permitted to increase but a baghouse and an extensive flue system was installed to save any metals that might be volatilized. When converting mattes, containing 5 to 6 per cent. lead and 200 to 300 oz. silver per ton, the flue dust from the baghouse contained 50 to 62 per cent. lead and 10 to 20 oz. silver per ton, and as the flue dust collected in the baghouse contained less than one-third of the total lead in the matte, the silver loss would not have been over one-half of one per cent. if it had been allowed to go out with the stack gases. The baghouse dust showed from only a trace to one-tenth of one per cent. of copper.

The results at Aguascalientes led the company to install converters of a similar type at Omaha for the treatment of concentrated lead-copper mattes and these with the baghouse attachments have been in successful operation since 1905.

One Lining Made 1000 Tons Copper

In 1908 a basic-lined converter was installed at Omaha for leady mattes, but after some trials they reverted to the acid-lined type, as there was no reduction of costs in the newer type, it required more careful working, there was considerable time lost in making the repairs, and the life of the lining was too short. Later experience at Perth Amboy would indicate that with sufficient care in operation of the blast furnace, furnishing mattes of desirable grade and with lower percentages of speiss, and proper care in handling the converter, a reasonable length of life of lining and lower costs could be obtained. Two runs on lead-copper mattes made at Perth Amboy gave 800 and 1000 tons of copper bullion respectively per lining, and a lower cost than any plant using acid-lined converters, that I know of, even on straight copper mattes, assuming for the same items similar labor and power costs. Baghouse costs and cost of smelting matte must, of course, be omitted for purposes of comparison with plants converting copper mattes direct from settlers. Probably one-third of the lead-copper matte converted was added cold.

Metal Losses Reduced

The baghouse flue dust contained less than 6 oz. of silver per ton and over 50 per cent. of lead and there was no sign of the "thick rose-colored coating," carrying a high percentage of "silver on tools and neighboring iron work" mentioned by Peters. In fact, the flue dust from the hood and flue near the converter showed no higher silver contents than obtained in similar flue dust from straight copper-matte converting with mattes of the same grade, say 150 to 200 ounces. Aside from the slag losses, originally figured upon the silica content of the ore, it may be stated that with a baghouse connection, there is practically no loss in metals in converting except the slight loss which is largely recovered in the shape of cleanings and sweepings that occur in turning up and down the converter vessel.

Small Flues Cause Loss

Without a baghouse and connected with a stack by a small short flue there may be a great, easily avoidable loss of copper and associated metals on any kind of mattes. At one plant where such an arrangement was in use the loss approximated 1700 lb. of copper with the associated gold and silver per day according to a series of gas measurements and analyses of the solid matter filtered from the gases. In general it may be said that if there is any considerable amount of copper in the flue dust at the bottom of the stacks the flue system is too small and greater settling capacity should be provided.

The arrangements of the converters and furnaces so that the pellets of matte, metal and ore blown out in turning up and down the converters may lodge in waste products, such as ashes and slag pots, may also occasion serious losses of metals, and soft dirt or ash floors in the converter plant results in the resmelting of a great deal of barren material at considerable cost and increased slag losses.

Bag Houses on Converter Fume

A great deal of trouble was experienced at Perth Amboy with the baghouse on the preliminary experiments. When constructed it was not expected that any serious difficulty would be had, but when the gases were turned into it the cotton bags were very quickly destroyed by the sulphuric acid formed from the rich sulphurous acid gases produced by the converter, especially in the second period. With more lead in the matte on the second trial and in less than three charges, the bags were also quickly destroyed. A number of tests on a small experimental baghouse gave no better results and a long sheet-iron flue to cool them and settle the sulphuric acid was built. This gave no better results as shown by the experimental baghouse. The admission of air near the inlet of the gases into the flue giving a dilution of about ten air to one of gas gave apparently good results on a few bags set in the baghouse when leady mattes with 10 per cent. of lead or upward were convened.

When the baghouse was equipped with about 1000 bags, the results were excellent for three charges, but the fourth was cold on the blow for copper and foamed; lead fumes were not produced in considerable quantities and all of the cotton bags were found to be moist with sulphuric acid and had to be replaced. About 140 woolen bags that had been used to fill out the house were not damaged seriously. The cotton bags were changed as quickly as possible and thereafter whenever the charge was cold and gave signs of foaming the gases were shut off from the bags and turned into the stack. By this means we secured a life of about 1475 tons of blister copper to a set of bags with the woolen bags still doing good service and apparently as good as ever. This would naturally lead to the adoption of woolen bags entirely as that seems to have been the result of experience elsewhere[2]. The theoretical percentage of SO_2 in the gases from the combustion of sulphur and the various compounds of sulphur with the necessary air is, by volume: 20.8 per cent. for Cu_2S to SO_2; 14.9 per cent. for FeS to SO_2; 17.4 per cent. for FeS_2 to $2SO_2$; 13.9 per cent. for Fe_3S_4 to $4SO_2$; and 20.8 per cent. for S to SO_2.

The compounds burned in converting seem to be Fe_3S_4 in the first part of the operation and Cu_2S in the second period.

*Consulting mining and metallurgical engineer to the Mexican-American Holding and Improvement Company, 20 Broad street, New York.

[1]"Modern Copper Smelting," p. 569.

[2]Sprague, Eng. and Min. Journ., March 5, 1910.

Gases containing as much as 9 per cent. by volume of SO_2 have been produced while maintaining sufficient draft to keep the converter building clear from gas and fumes.

Sulphuric Acid in the Gases

While at times there was a large amount of sulphuric acid in the gases it must not be considered that SO_3 is formed in the converter. As the gases are one of the products of the combustion in the converter they must have the same temperature as the other product, which is the FeO forming slag, and evidently cannot in any case be below the melting temperature of copper or 1085 deg. C. As SO_3 is decomposed[3] into $SO_2 + O$ at between 900 and 1000 deg. C. it is impossible for it to exist in converter or reverberatory gases. SO_3 is, however, formed at the temperature of 430 deg. C. and in greater or less amounts at 380 to 700 deg. C. in the presence of catalyzers. It is stated by Deville[4] that at 1200 deg. C. sulphurous acid is decomposed into sulphuric anhydride and sulphur according to the equation $3SO_2 = 2SO_3 + S$, but this needs verification. In any event even if SO_3 should be formed at the higher temperature it would be decomposed again at 1000 deg. C. to SO_2 and O—so that SO_2 would be the product we would have to deal with.

Formation of H_2SO_4 Checked by Admission of Air in the Flues

The hood and flues at Perth Amboy as originally installed were built of brick or brick-lined. The conditions would have been ideal for the production of SO_3 by catalytic action if there had been sufficient contact between the catalyzer and the gases, as they were maintained at the proper temperature for a considerable distance. The catalyzers were the flue dust consisting of copper oxides and sulphates, iron oxides, etc., which always accumulate in the flue.

The dilution of the gases in some of the earlier experiments was as low as 1 to 1. Naturally the lengthening of the flue and cooling of the gases by radiation from steel surfaces was useless, as the SO_3 had already been formed and the impossibility of settling a fine mist of H_2SO_4 under the conditions prevailing is well known in the acid industry. The remedy was not to form the SO_3 in excessive amounts and this was accomplished by admitting a large excess of air with the gases at the hood and cooling them quickly below the temperature at which the catalytic action occurs. At the same time sufficient heat must be maintained in the converting vessel to volatilize considerable lead and zinc, the oxides of which, formed upon admixture with air at the throat, would neutralize any small amounts of sulphuric acid that might be formed. When foaming occurred in the second period of converting, the enormous volume of sulphurous acid given off neutralized the effect of the air admitted for dilution and quick cooling of the gases, with the result that considerable sulphuric acid was formed. As the charge was cold and practically no lead or zinc was being volatilized, the acid was not neutralized and destroyed the bags. As the woolen bags were not so readily attacked by the acid and only comparatively small amounts were formed for a short period they were not destroyed. A small amount of sulphuric acid, however, will rot cotton fabric.

Utilization of Glover Tower Advocated

Personally I am opposed to the bag-house system for handling the fume from converters as wrong in principle and costly at the best in practice. My idea is to utilize an adaptation of the Glover tower packed with quartz and sprayed with a strong stream of cold water. To work this out the connection between the mouth of the converter and the hood should fit as closely as possible; inject a jet of steam with the gases at the hood to insure the dampness of the fume; maintain the temperature of catalytic action so as to produce some H_2SO_4; then cool as much as possible by radiation through long flues and pass into the tower by a pressure fan. The flue and tower would have to be lined with acid-proof brick. Where sulphuric acid was marketable I would absorb all the SO_2 in water and afterward liberate it by the heat of the gases and send it to the chambers for conversion into H_2SO_4. Otherwise the water would be used over and over again and the SO_2 liberated to the air until the water was saturated with zinc and iron salts which could be put into a marketable or usable form. To keep up a uniform supply of gas for the acid chambers several converters should be in operation and the converter plant should be built and the furnaces and settlers arranged to give the necessary elasticity.

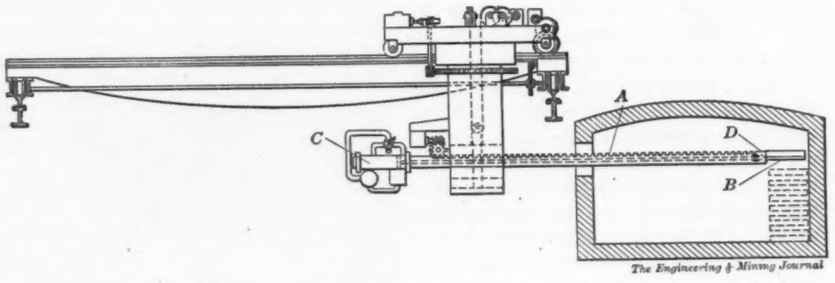
Atlantic coast and eastern plants in general will soon be forced to take care of their gases and fumes and there is no reason why they should not be made a considerable source of profit. In this day and age there is no excuse for the apathy that permits the waste of thousands of tons of sulphur and arsenic and allows them to vitiate the air where there is a profitable market, only requiring the exercise of some capital, knowledge and ingenuity for their conservation.

[3]The Mineral Industry, Vol. 10, p. 605.
[4]*Comptes Rendus*, Vol. 60, p. 317.

Furnace Charging Apparatus

A recent patent (U. S. Pat. 951,304) for charging reverberatory furnaces has been granted A. C. Clark, of Perth Amboy, N. J., and F. L. Antisell, of New York.

The apparatus consists of an overhead crane supporting a carriage running at right angles to the craneway. Suspended from the carriage is a housing mounted to turn relatively to the carriage and supporting a peel *A*, which can be moved up and down as well as transversely. The novel feature consists of a shelf *B*, which is actuated by a bar headed in a piston in the cylinder *C*, and a stop *D*, which prevents the charge from spreading when the shelf is suddenly withdrawn. The inventors claim that with this type of crane the charge will be uniformly and evenly stacked, utilizing the entire available space of the furnace intended for charge.



Clark and Antisell Charging Crane

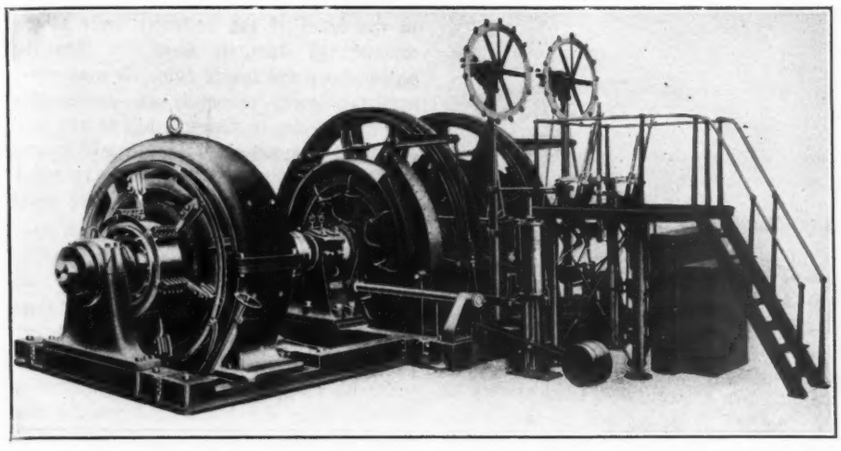
Ferro-Molybdenum Now Made by the Thermit Process

The number of metals and alloys produced by the Thermit process has now been extended to include ferro-molybdenum, which is coming into quite general use as a valuable alloy in high-grade steels. Up to the present time the pure molybdenum only has been produced by the Thermit process, but in order to supply a demand for ferro-molybdenum, that alloy is now being manufactured.

It is claimed that the advantage of ferro-molybdenum over metallic molybdenum consists in the fact that it does not oxidize, and also that it may be more easily alloyed with steel, owing to its lower melting point.

The Hecla Mine Hoist

The operation of large electric hoists has received careful consideration during the last few years. With the introduction of the polyphase alternating-current generators and high-tension transmission lines, electric power has become available in most of the great mining districts. The simplest method of utilizing this power for hoist work is through the direct application of an alternating-current induction motor. If the capacity of the hoist is comparatively small, this is satisfactory, but where heavy loads must be handled at high speed, the peak due to acceleration of the moving parts is often far in excess of the average requirements of the hoist. If the hoist is at the end of a long transmission line, an excessive amount of copper must be installed to prevent an undue drop in the voltage during the maximum demand. In any case, the power company must install all its equipment with reference to peak instead of the average load and must charge accordingly.



ELECTRIC HOIST AT THE HECLA MINE, BURKE, IDAHO

FLYWHEEL-MOTOR GENERATOR

To meet these conditions the flywheel motor-generator type of hoist has been developed. The heavy peak loads are thus eliminated from the line and the wear on the mechanical brakes is reduced.

The accompanying illustration shows the electric hoist recently installed by the Hecla Mining Company, Burke, Ida. The power available is a 3-phase, 60-cycle current, ranging from 2080 to 2300 volts. A 450-h.p., 3-phase, 60-cycle motor drives the direct-current generator. The flywheel weighing 30,000 lb., is mounted on the shaft between motor and generator; the direct-connected exciter is carried upon the shaft extension at the end of the set. The entire electrical equpiment was supplied by the Westinghouse Electric and Manufacturing Company.

CAPACITY OF HOIST

The hoist, built by the Wellman-Seaver-Morgan Company, consists of two reels, each capable of holding 2500 ft. of ⅜x4-in. flat rope. Under normal conditions the hoist operates balanced; that is, the empty cage descends as the loaded cage is raised. If desired, however, either reel may be operated independently of the other. The winding diameter of the reel varies from a minimum of five feet to a maximum of 13 ft. when the entire 2500 ft. of rope is wound up. Each of these reels is fitted with a Webster, Camp & Lane band friction clutch, post brake and indicator.

The brakes, which are operated by means of combined air and oil cylinders and heavy counterweights, are so designed that they are set by the weights and released by means of air cylinders.

This hoist has a maximum hoisting speed of 2400 ft. per min., and will handle an unbalanced load of 16,000 lb., including rope, from a depth of 2500 ft. The complete equipment, including the motor-generator set, hoist motor, slip regulator, switchboard and hoist, weighs over 300,000 pounds.

A movement is on foot in Nevada to erect a monument over the grave of John Comstock, discoverer of the famous Comstock lode. He is buried in the Bozeman, Mont., cemetery. Frank B. Mercer, who recently made the discovery that the grave was unmarked, has started the movement.

Some Interesting Data from the Rand

Although the gold mines of the Witwatersrand in the Transvaal have become world famous as steady producers, and data concerning their operations, costs, etc., are read with interest whenever mining men read mining papers, yet many who are familiar with the steps taken there in the development of the tube mill, heavy stamps, cyanide practice, etc., have but a scant idea of the general characteristics of the mining district. The accompanying table is compiled from data included in the 1909 report of the Rand Mines, Ltd., one of the largest of the Rand consolidations, and is given as illustrating some of the principal features of the mines.

Company.	Main Reef.		Main Reef Leader.		South Reef.		Stoping Widths.			Mill Heads, Dwt. per Ton.	Actual Extraction, Per Cent.
	Width, In.	Per Ton, Dwt.	Width, In.	Per Ton, Dwt.	Width, In.	Per Ton, Dwt.	M.R., In.	M.R.L., In.	S.R., In.		
Glen Deep....	24.0	13.4	35	11.4	18	10.4	66	56	60	6.995	87.77
Rose Deep....	26.7	9	13.4	21.1	21.3	12.5	71	30	51	6.63	83.85
Geldenhuis...	22	8.9	11	28.3	19	11	47	39	52	6.355	84.18
Nourse.....	23	8.3	12	25.3	14	24.5	61	46	50	7.829	80.36
Ferreira.....	25	3.7	28	20.5	23	21.4	70	70	57	11.20	87.4
Crown.....	20.7	3.7	23.9	16.6	21.6	16.8	63.8	63.8	63.2	8.21	90.7
Durban Roodepoort.	24.4	11.0	....	....	6.4	51.3	61	....	40	7.74	79.0

The general altitude of the Rand is 5600 to 6000 ft. above sea level. The three reefs which form the series are approximately parallel. In 1909 a vertical shaft of the Crown mines passed through the Main Reef Leader 103 ft. below the South Reef, and the Main Reef 10 ft. below the Main Reef Leader. Sometimes the main reef and the leader merge into one vein. The dip of the reefs is flat, 30 deg. from the horizontal being rare and the average being perhaps 15 to 20 deg. The Main Reef is nearly always the largest and the lowest in grade. The figures in the table make no attempt to represent the averages even for the individual mines, but are merely the results of the work of the last year. However, on the Rand, uniformity is the rule and these figures may be considered as fairly representative.

New Railway in Chihuahua

Consul L. J. Keena states that the Mexico Northwestern railroad will build a branch in the State of Chihuahua, from San Antonio to Cusihuiriachic, and gives the following particulars: "The distance is about 15 miles, and the line will tap the old and rich mining country around Cusihuiriachic, a district reputed to have produced more than $25,000,000 in silver It is estimated that there are over 50,000 tons of ore on the dumps at Cusihuiriachic, of too low a grade to be profitably shipped by wagon but available for railroad shipment."

Tailing Dams and Conservation of Mill Water

Two Settling Ponds Necessary. Dams May Be Built of Masonry or Concrete; Mill Tailing Frequently Used. Much Water Is Saved

BY W. H. STORMS*

In mining districts where water is scarce, it is often desirable, if not absolutely necessary to impound the mill tailing and to pump the water back to a tank or reservoir for re-use in the mill. The method adopted to accomplish this depends largely on topographic features. In a district cut by narrow gulches, having heavy grades, a different course must be pursued than is possible in a place where there are broad, amphitheater shaped basins among the hills.

Where the former condition obtains, a series of settling reservoirs may be built, behind which the mill tailing may be temporarily impounded, the sand settled and the water pumped back to a reservoir at some higher level. By this method the tailing is impounded for a short time only, the settling ponds being sluiced out at more or less frequent intervals, depending on the capacity of the ponds and the amount of material daily flowing into them. By the other method, when a larger area for the pond is available, the tailing may be impounded and held on the site indefinitely.

Construction of Reservoirs

The manner of constructing these two types of tailing reservoirs is entirely different. Where the only available site for the pond is in a narrow gulch, the most satisfactory way is to build at least two dams, thus forming an upper and lower pond. The distance between them need not be greater than the thickness of the dam forming the first one. There is no advantage usually in having them far apart. The farther the lower reservoir is from that above the mill, to which the water must be pumped, the greater the distance and hight to which the water must be forced, which might have been avoided by a more judicious choice in the selection of the site in the first place.

*Mining engineer, 2437 Hilgard avenue, Berkeley, Cal.

The dams should be substantially built and solidly anchored to the banks, to resist freshets. They may be of masonry or concrete, or even of a crib of timbers filled with rock and sheeted with plank on the upper face. In each dam, and opposite the lowest part of the gulch, must be provided a shaft two or three feet square. This shaft is built in such manner that three sides are permanently closed, but the fourth (up-stream) side is so arranged that it may be open from top to bottom or may be closed to any desired hight by placing pieces of 2x6-in. planks against the timber frame, each laid on edge horizontally, thus raising or lowering the level of the water in the pond by 6 in. whenever a plank is placed in position or one is taken out, as the case may be.

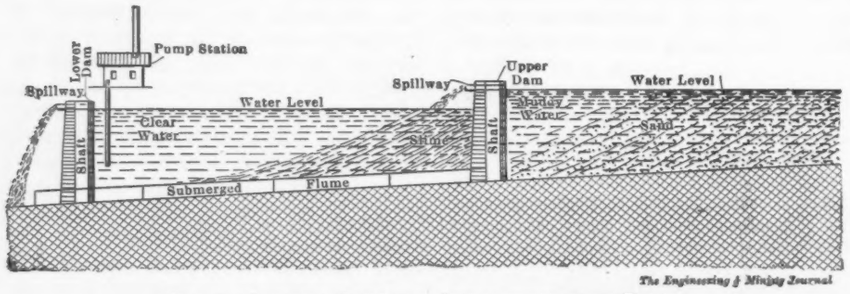


FIG. 1. SECTION SHOWING ARRANGEMENT OF DAMS

The bottom of the shaft in the upper dam should connect with a covered flume which extends underneath the upper dam and downward along the bedrock, through the lower pond, to and beneath the lower dam, where it connects with the shaft in that dam, which like that in the first, extends from bedrock to the top of the dam. This flume should be weighted with rocks to keep it in position when the water covers it.

By studying the arrangement above described, it will be seen that the water, as it comes from the mill with its load of sand and silt, may be impounded above the upper dam, or it may be allowed, if desired, to pass through the flume beneath that dam, and through the lower pond and dam to the cañon. Or the gate of the flume at the base of the upper dam may be closed and the upper reservoir filled with water and tailing. Naturally, as soon as the water begins to accumulate above the upper dam, the coarse sediment carried by it settles to the bottom.

When the water in this pond has risen to the level of the spillway weir at the top of the dam, it overflows into the basin above the lower dam. It may carry into the lower reservoir an appreciable amount of fine sediment, but if the reservoir be of good size, the silt will mostly settle about the upper end of the pond. The pumping station is near the lower pond.

Emptying the Reservoirs

When the upper basin is nearly filled with sand, it has, for the time being, practically outlived its usefulness and must be emptied. This is accomplished by removing the horizontal planks that close the shaft in the upper dam on its up-stream side, one or two being taken out at a time. The tailing stream from the mill will then flow through this lower outlet and into the shaft, passing out through the flume beneath the lower pond. This stream will quickly cut out a large amount of the sand accumulated in the pond, though the operation may be greatly facilitated by employing some of the clear water from the mill reservoir under pressure, or by a stream from the pump. By either means the sand may be removed rapidly at small cost for labor and water. As fast as the sand is washed

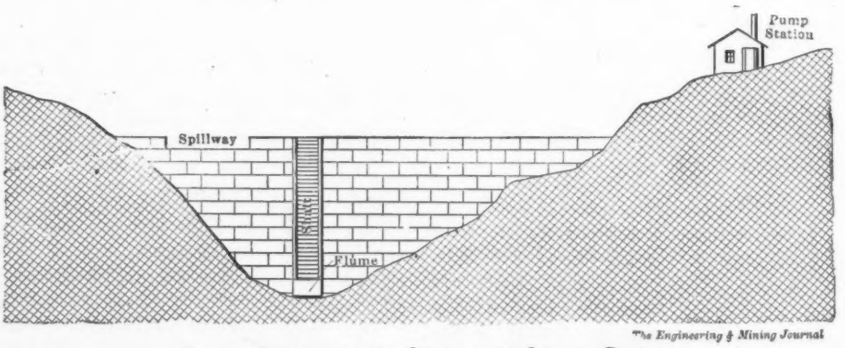


FIG. 2. LONGITUDINAL SECTION OF LOWER DAM

out, additional planks are removed from the shaft until the bottom is reached, when they should be replaced and the dam refilled.

The lower reservoir will accumulate a large amount of fine sediment, and it may be cleared in the same way as the upper pond. The accompanying sketches, Figs. 1 and 2, illustrate the manner of building the dams of the type here described.

Tailing Ponds In Broad Basins

The construction of tailing ponds in broad basins may be accomplished in a different manner from that above described. Under this latter condition it is essential that the pond be placed at some point below the millsite, and that there be a suitable site for a clear-water reservoir (Figs. 3 and 4). The first thing to provide is a covered flume, constructed of 2x12-in. pine lumber. This may be laid either on the surface of the ground or in a shallow trench and anchored down with rocks to keep it from floating when submerged. This flume commences at a point below the site of the proposed dam and extends up into the pond, as far as what will be the level of first discharge of clear water. The flume may discharge into a pipe line or into an open box through which it may run to the clear-water reservoir below. When the covered flume has been laid and connected with the clear-water reservoir at the pumping station, the construction of the dam may be commenced by throwing up a dike of earth and rock. If the ground be suitable, a team and scraper may be employed. If the earth at the dam site be rocky, all of the work must be done by hand with pick and shovel. The dam may be built in crescent form, the convex side being down stream if desired. There is no particular advantage in this other than it affords additional room for tailing.

It will not be necessary to build this earth dam to a hight greater than 8 or 10 ft. It should be well built, the top being at least three feet wide. The material of the dike will assume a natural slope angle of about 35 degrees.

Delivery of Tailing to Pond

When the preliminary dam has been completed, provision must be made to deliver the stream of tailing from the mill to the impounding basin by the construction of boxes or launders from various points on the hillside above the reservoir. It is best to divide the tailing into two parts, one flume taking half of the stream from the tailing ditch and carrying it out above the reservoir, 12 or 15 ft. back of the dam, and, say eight to 10 ft. above the ground at the highest place; the other being taken by ditch and flume around to the opposite side of the reservoir, where it is similarly carried out by flume back of the dam and above it.

The floor of the reservoir at the deepest place should be, if possible, 50 or 60 ft. lower than the lowest point of discharge on the main tailing ditch from the mill. From a point on this ditch, about 100 ft. from the dam, one-half of the tailing stream is taken out and conducted by a trench to a box from which it flows into its launder about 5 ft. higher than the top of the dam. The flume on the opposite side of the reservoir site should be similarly arranged. It will be observed that the main tailing ditch, together with the auxiliary distributing flumes, practically encircle the site of the reservoir.

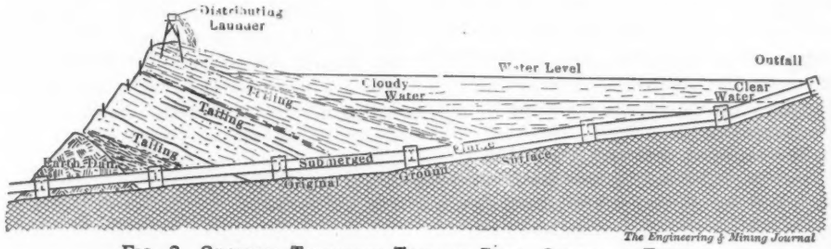


Fig. 3. Section Through Tailing Dam, Showing Flume

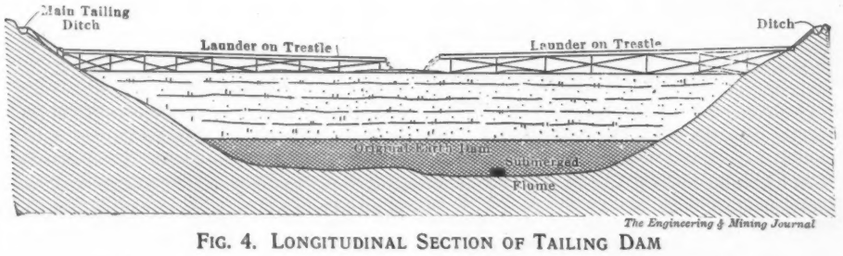


Fig. 4. Longitudinal Section of Tailing Dam

Distributing Launders

The distributing launders may be built of 1-in. lumber, and must be supported as they rise above the ground by a light but well built trestle. It must be strong enough to carry the stream of pulp, and so constructed, by bracing, as to resist wind. The size of these launders must be determined by the volume of material to be carried by them. As they are built on a heavy grade, ½ in. or more to the foot, a box 10 in. wide and 8 in. deep will carry all the pulp from a 60-stamp mill. In a country where the winters are severe, the ditches and flumes must be built on heavier grades than are permissible in a more temperate region, or the pulp stream will freeze and the entire flume will become a mass of ice, the weight of which is likely to break the boxes and trestle. Sharp bends in the launders should be avoided.

Launder Gates

The two distributing flumes, each built on a curve, following approximately the form of the dam, should be provided with side outlets at several places, to facilitate the discharge of the tailing at, or near, any desired point along the inner face of the dam. A fairly uniform distribution of the material is essential to the most satisfactory operation of the scheme. To control the pulp streams, gates sliding vertically in slots, or a sack of sand may be placed in the box just beyond the side opening. When it becomes necessary to discharge the stream at some other point along the line, the gate is raised (or the sack removed) and the side gate closed when the stream flows to the next gate. Care must be taken not to fit the gates too tightly or they cannot be moved when desired. It is better to have the gates leak than to have them bind. The gates must be readily accessible to the workmen. This can be accomplished by nailing cleats to the legs of the trestles, thus forming rude ladders wherever necessary.

Accumulation of Tailing on Dam

As the sand accumulates along the two lines of distributing flume, which extend out over the pond, it gradually rises to the level of the top of the dam of earth, when the upbuilding of the tailing pile commences. By the employment of the several outlets in the distributing launders it is presumed that a fairly even distribution of the sand has been made across the basin and adjacent to the dam. The workmen must now watch the accumulation of the sand constantly, and by means of shovels build up the sand pile on the outer edge, thus continually raising the front of the dam. This work is facilitated by driving stakes into the sand and setting 1-in. boards on edge against them to confine the sand and keep it from running over the outer face of the dam.

Every endeavor must be made to prevent a breach being cut in the dam, and an even distribution of the sand around the rim of the dam is a great aid in preventing a breach. High winds sometimes

are the cause of much trouble, blowing the stream from the launders over the outer face of the dam and causing breaches to form. At such times constant vigilance is necessary, and occasionally it will be found advantageous to set up a screen of boards near the outlet of the launders, to break the force of the wind.

In building the dam in the manner described, its outer face will present a series of steep terraces, as in Fig. 3. As the dam is built higher and higher by the accumulation of sand, the surface of water in the pond keeps pace with it, though always two or three feet lower than the crest of the dam. The level of the water in the pond is always determined by the hight of the intake of the drainage flume. Sooner or later the sand and slime will encroach upon the intake, when a new section of box must be added at its upper end or it will become covered with sand and only muddy water will flow into the reservoir at the pumping station. The length of the section of box that can conveniently be added to the outflow flume will depend upon the slope angle of the hill.

It is a good idea to keep a floating crib, or box, 4 ft. square and 12 in. deep, about the intake of the outflow flume. This will prevent from passing down through the flume to the clear water reservoir any grease that may be floating on the surface of the water, as well as other floating objects on the surface of the pond.

Lengthening of Flume

In constructing the section of the outflow flume, the joints should be provided with cleats on bottom and sides which project beyond the upper end of the box so that the new length to be added may be slipped in, butting squarely up to the upper end of the last section of box. A fourth cleat should then be nailed across the top, and the side cleats also nailed to the new section of box. These cleats should be of 1x6-in. lumber and firmly nailed.

As the sand accumulates in the reservoir, the distributing launders must be raised on new and higher trestles. The intake points of these launders and the outflow point of clear water must be raised from time to time to keep pace with the daily upbuilding of the dam.

By the employment of the scheme here described a great deal of the water can be returned to the mill and the tailing may be impounded for future treatment, if desired. Two men on two shifts can look after a large reservoir, and when the trestles have been rebuilt and everything is in good condition, one man per shift can usually manage things with little trouble. The lumber employed in the construction of trestles, and the most of that used in building up the front of the dam, is buried in the sand and consequently lost, but the amount is small.

Would Zinc Smelteries Pay in Mexico

By Thorington Chase*

It seems unaccountable that in a country like Mexico producing so much zinc and having such large undeveloped resources of zinc ore, no real effort to erect a zinc smeltery has ever been made. British capital was at one time organized for this purpose, but influence from unexpected quarters, it is said, was brought to bear, with the result that, though flattering concessions had been already granted by the Mexican Government, the enterprise was abandoned. Mexican zinc producers have ever since felt an undefinable bitterness against the concatenation of causes, which as they think, deprived them of a home market for their zinc ore. Be that as it may, it seems to me that such an undertaking in the Republic would be feasible.

Abundant Supply of Zinc Ore

Since a smeltery should own enough mines to guarantee it a supply of ore at all times, the first step would be to secure properties upon reasonable terms. Such zinc properties are abundant; and as the presence of a zinc smeltery in Mexico would practically open a market to deposits of zinc yielding from 30 to 35 per cent., a large number of low-grade properties, many of which have not been denounced, would, for the first time, be seeking capital for development. Even though should none of the numerous calamine mines be obtainable, sufficient zinc ore could be secured from these low-grade properties alone and for a very moderate outlay, to assure the smeltery an indefinite supply. It would require only a few weeks trip among the principal zinc camps to convince the most pessimistic investor of this fact.

The cost of fuel would be the chief consideration, and while Monterrey and Saltillo, as sites, have the advantage of central location with reference to the ore supply, local zinc smelting must have its inception in the neighborhood of one of the great coal-producing areas of Mexico. The expensive process of zinc smelting which now obtains, makes fuel at above $2.50 gold per ton, almost prohibitive. and coal concessions, procured from the Mexican Government, would greatly facilitate matters in this connection. I might mention here that Wm. H. Kinnon (now in charge of the Mazapil Copper Company's copper smeltery at Concepcion del Oro, Mexico,) has devised a remarkably cheap and efficient method of firing in zinc smelting, and with its introduction upon a generous scale, the fuel problem will become one of minor significance.

*Chief chemist, Concepcion smeltery, Concepcion del Oro, Mex.

Construction and Operating Costs Would Be Low

Since Mexican capital awaits investment in this line of enterprise, the building of a small smeltery at the outset would furnish a nucleus, about which large extensions of this profitable industry could take place. The cost of a zinc smelting plant in the United States, is about $8 per ton of annual capacity. A plant, smelting carbonate and silicate ores which required no calcining, could be erected at less cost.

With the cheap labor available in Mexico ores running as low as 30 per cent. zinc, provided they do not contain over 8 per cent. CaO, 8 per cent Fe, not much Pb and not over 15 per cent. SiO_2, could be smelted at a profit, when properly mixed with richer mineral. Zinc ore assaying 35 per cent. could be smelted to especial advantage since the copper, lead, silver and gold contents of the ore are recovered as by-products.

Deposits of clay suitable for construction purposes exist in the state of Chihuahua and elsewhere in the Republic.

The presence of zinc smelteries in the Republic would lead to the economic treatment of low-grade ores by the Sutton, Steele & Sutton Concentrator (manufactured in Dallas) which a careful study of the problem convinces me to be the most applicable to Mexican ores, no calcination or water being required. The thousands of tons of 15 and 20 per cent. zinc that now are thrown into the cañons to be carried away by the rains, would then be saved and treated at a profit.

The protective tariff now in force against Mexican zinc ores offers a final and convincing argument for the establishment in Mexico of zinc smelteries. Twenty dollars gold for 40 per cent. zinc ore at $6 per ton is the best figure the Mexican producer can hope for at present. Duties on the lead contents are for the shipper's account, and penalties are exacted for iron, lime, manganese and cadmium by most buyers, with more or less stringent restrictions placed upon the other constituents of the ore. The producer feels that with zinc smelteries in Mexico, the industry would bring better returns: and there is scarcely a shipper who would not be willing to subscribe to the project in question.

New Chimney for Orford Copper Company

Work has been started on the construction at the plant of the Orford Copper Company, Constable Hook, Bayonne, N. J., of a brick chimney that will stand 365 ft. high. It will be close to a similar stack, and with the completion of the second stack it is expected that residents of Staten island, across the Kill von Kull, will have less reason to complain of unpleasant odors from the works.

Electric Smelting of Iron Ore at Heroult, Cal.

Graphite Electrodes Adopted; Handling of Furnace Gases Modified; 1500-kw. Furnace Used; Cheap Electricity Necessary for Commercial Success

BY JOHN TYSSOWSKI

The electric iron-reduction plant at Heroult, Shasta county, Cal., should be of profound interest to the industrial manufacturers on the Pacific Coast. The founding of an iron industry on the Coast would unquestionably be of the greatest benefit to all of the building and structural industries in the region, and under the existing conditions it seems as if this can only be looked for with the success of the electric-shaft furnace.

Work in Foreign Countries

That the successful smelting of iron ore in an electric-shaft furnace is possible, has been demonstrated on an experimental scale in Canada and in Sweden. The experiments[1] performed at Sault Ste. Marie in 1905-6, under the auspices of the Canadian government, proved entirely successful it is claimed. The electric iron-smelting industry has, however, passed the experimental stage and Eugene Haanel, director of the Canadian Department of Mines, has the following to say in reference to electric smelting:

"It may be of interest to know that at Trollhatten, Sweden, 12,500 h.p. are to be employed on the production of pig iron by the electric process. The furnaces will be of the Domnarfvet type of 2500 h.p. capacity each. At Tysse, Norway, two furnaces for the smelting of iron ore in the production of pig iron are being erected, each 2500 h.p. capacity, Domnarfvet type. Two steel furnaces of 600 h.p. capacity each are also being put in place at the same plant."

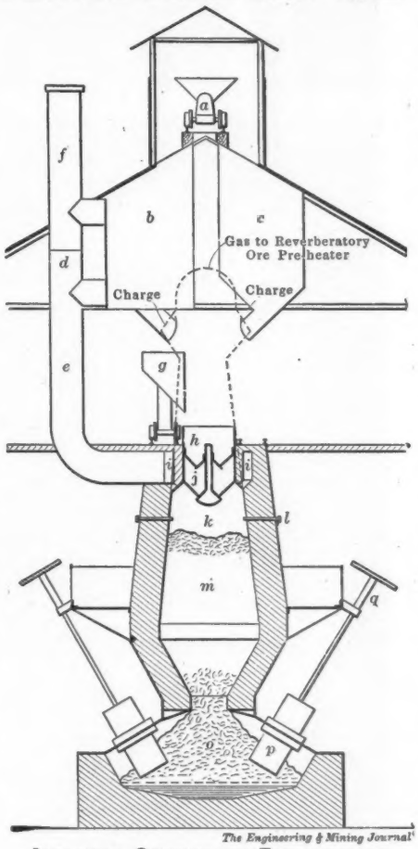
This shows that the smelting of iron ores in the electric-shaft furnace is possible and on a commercial basis. On the Pacific Coast, hydroelectric power is available at low cost and in great quantities, and since, owing to the scarcity of good coking coal, we cannot look for the building up of an iron-smelting industry using coke-blast furnaces, there seems to be no reason why the electric furnace should not solve the problem.

Electric Iron Reduction in California

At Heroult, Shasta county, Cal., Dorsey A. Lyon, formerly professor of metallurgy at Stanford University, is in charge of an electric, iron-smelting plant and has already been able to demonstrate the possibility of making pig iron with the electric-shaft furnace. The ore available at Heroult is a magnetite occurring as a magmatic segregation on the contact of limestone and diorite. This contact shows plainly in the accompanying photograph of the Heroult limestone and ore quarries worked within a stone's throw of each other.

Character of Ore and Fluxes

The orebody is claimed to be quite uniform for a considerable width, but, of course, fades off into the diorite. Typical



IDEALIZED SECTION OF FURNACE AND ACCESSORIES

analyses of the magnetite are: Fe, 69.90-70.39 (Fe_3O_4 89.4, Fe_2O_3 7.3) per cent.; MgO, 0.10-trace; MnO. 9.18-0.07; SiO_2, 2.40-1.65; P, 0.011-0.011-0.0107; S, 0.009-0.02. The face of ore exposed in the cut is about 50-ft. square, and shows according to Mr. Lyon a mean content of 69.7 per cent. iron. The average analysis of the limestone is: SiO_2, 1.20 per cent.; Al_2O_3, 0.50; MgO, 1.10; CaO, 53.80; FeO, 0.20, or equivalent to 98 per cent. calcium carbonate. For silica, andesite of the following analyses is available; SiO_2, 55.12 per cent.; Al_2O_3, 21.45; FeO, 8.77; CaO, 5.14; MgO, 3.75; H_2O, 4.70.

History and Ownership of the Magnetite Deposit

The magnetite deposit was held by the Shasta Iron Company for about 25 years but nothing was done until the summer of 1906, when the matter of the possibility of smelting the ore by electricity was brought to the attention of H. H. Noble, president of the Northern California Power Company. This company supplies practically all the power used by the various industrial works and smelteries in Shasta county, and at that time had something like 2000 h.p. available for which there was no use. An outlet for this power was hence desirable. As a result of correspondence with Doctor Heroult plans were laid for the erection of an electric furnace on the Pitt river at a point convenient to the quarries.

Situation of the Quarries

The quarries are situated on a high ridge between the McCloud and Pitt rivers, close to their junction. A tram line, 6300 ft. in length, connects the quarries and the head house of a gravity incline where the ore is crushed. The gravity incline is 1800 ft. long, varying in grade from 15 to 32 deg. A loaded car pulls up the empty one. It is about 600 ft. from the base of the incline to the bin for ore and flux. Ore is drawn from the bins into a charging car which is trammed directly to the furnace.

Experimental Furnaces

The first electric-smelting furnace built at Heroult was a 1500-k.w., three-phase one of the resistance type. Experiments were started with this furnace in July, 1907, but it was soon found that a furnace of this type embodied many difficulties which precluded its commercial success. As a result, it was abandoned, and experiments continued in a 160-k.w. single-phase furnace which was run from January to October, 1908; in all there were seven runs, the last of which was continued for about 42 days, a production of approximately one ton of pig iron per day being made.

Drawing on the experience gained with these furnaces a second 1500-k.w. furnace was built and started up about May, 1909, since which time it has been in more or less continual operation. It has been during this last period that a practical commercial furnace has been evolved.

[1]Report on "Electric Smelting Experiments at Sault Ste. Marie, Ont.," Canadian Department of Mines, 1907, page 92.

Electrical Equipment of Furnace

The electrical equipment of this last furnace is such that the generation of energy in the furnace is controlled externally so that the electrodes need only be moved to accommodate their wear in the crucible of the furnace. There are three General Electric, oil-insulated, water-cooled transformers rated at 750 kw. capacity each. They are for a 60-cycle, 2200-volt primary current and a secondary range of from 35 to 75 volts constant output. The secondary current varies from 10,000 to 21,400 amp. On the primary circuit there is a dial switch controller giving three-volt steps in the secondary. The efficiency of this apparatus is 98.6 per cent. at 75 volts on the secondary and it is guaranteed for two hours overload up to 25 per cent. Test shows the rise in temperature under full load to be 35 deg. C. Recording volt- and ammeters are included in the installation.

Present Furnace

The photograph showing the present electric furnace was taken at the time of my visit to Heroult, in March last. Owing to the poor light it was impossible to get a clear view of this new furnace. The accompanying drawing shows the arrangement of the furnace before the recent alterations were made. The new furnace is of the three-phase type, with six electrodes. Referring to the drawing, the parts of the furnace are: *a*, supply car; *b*, ore preheater; *c*, charcoal bin; *d*, by-pass damper; *e*, gas flue; *f*, gas stack; *g*, charging car; *h*, upper hopper; *i*, annular space; *j*, lower hopper; *k*, combustion chamber; *l*, air inlets; *m*, bosh and reducing stack; *n*, contracted throat; *o*, melting crucible; *p*, electrode; *q*, electrode gearing. The six electrodes are so arranged around the furnace that the electric current passing between electrodes produces the necessary heat to smelt the charge. The molten iron and slag are collected in the crucible and discharged through the tap holes and spouts shown, as in the ordinary iron blast furnace.

Charcoal By-product Plant

The plant at Heroult also includes retorts for making charcoal and a complete by-product recovery plant. The retorts are shown in an accompanying illustration. The charcoal retorts are of the standard vertical design remodeled to fit local conditions. The equipment of the charcoal plant consists of eight vertical retorts mounted in batteries of four each and four preheaters, (the retorts are set in a concrete furnace lined with firebrick); 17 cages to fit the retort, each of two-cord capacity; eight tubular condensers, each connected to a retort by a copper vapor pipe; seven tanks for collecting condensed vapors and the necessary stills, etc., for refining the crude distillation products from the wood. Wood alcohol, tar, acetic acid, etc. (and later lead acetate by the electrolytic method), will be made at this plant. The plant is equipped with the necessary conveyers, pumps, etc., housed in wood-frame, galvanized-roof building, and was constructed under the direction of W. B. Harper.

Electrode Troubles

Even though the new furnace at Heroult was designed along lines suggested

Heroult Electric, Iron-smelting Shaft Furnace

by the data gathered in the operation of the experimental furnace, nevertheless, when the new furnace was put into operation, a great many difficulties arose which had not been encountered in the operation of the previous furnace. From the start, the chief difficulty has been the maintenance of the roof of the crucible. This difficulty has been directly traceable to electrode troubles. When the furnace was started, carbon electrodes 20 in. in cross-section were used. These were known as the "built-up" electrodes. They soon began to break off and so caused an arcing between the broken pieces of electrode near the roof of the crucible the intense heat thus generated quickly melting out the roof of the crucible. For this reason the conclusion was reached that some electrode other than the carbon one would have to be adopted.

Graphite Electrodes Tried

In July, 1909, an order was placed for 9-in., round, graphite electrodes, the latter being the largest that the manufacturers would guarantee as giving satisfaction. They were not received until December. A trial run was then made with them and, having proved more satisfactory than the carbon electrodes, an order was at once placed with the manufacturers for a carload. The graphite electrodes were not received until April, which was after the time of my visit, but I am informed by Mr. Lyon, to whom I am indebted for the data on the Heroult operations, that they are giving fairly good satisfaction. However, it would seem that the electrode problem is still far from being solved, and that there will yet have to be a great deal of work done upon this subject before an electrode can be put upon the market which will be satisfactory for such work as is now being carried on at Heroult.

Many Different Kinds of Electrodes on Market

At the Halcomb Steel Works, at Syracuse, 17-inch, round electrodes are now being used, it is stated, with great success. These are manufactured by the Electro Metals Company, of Welland, Ont. The National Carbon Company has been working hard on the electrode problem and it is stated that their electrodes will carry an extremely heavy current. An electrode made of anthracite coal and imported from France, is being used at several places, and these are also said to be giving satisfaction. The latter are 16 in. square and about 6 ft. long. However, none of the above are being used in furnaces where the direct smelting of ores is being practised. The only other place where this is being carried on is in Sweden. The electrodes used in the Swedish furnaces are said to be made in Sweden by Dr. Forssell.

Furnace Charged from Side

According to the last changes, the ore, instead of being charged into the top of the furnace through a charging bell, as shown in the drawing, and as is customary in the Swedish practice, is dumped into the furnace from the side at a point indicated by the dotted lines in the drawing. A portion of the furnace gas is taken out from the top of the dome cap to the stack and passed through an inclined brick-lined preheater (practically a small reverberatory furnace) from which the ore is drawn into steel cars

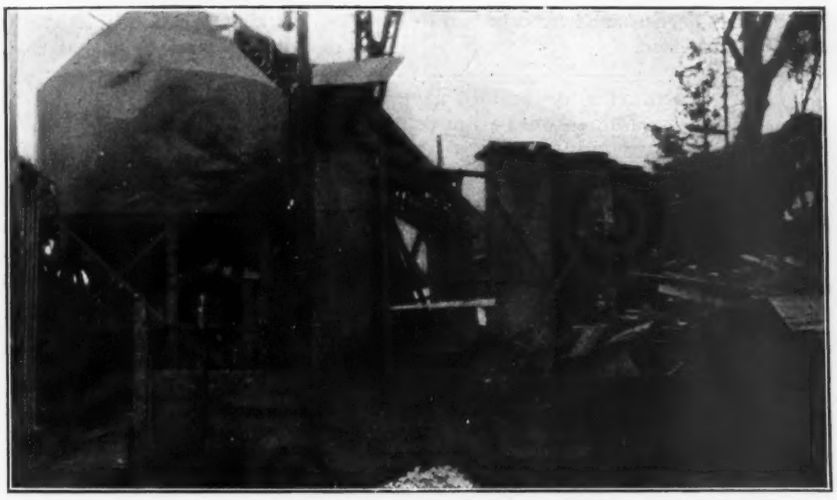
running on a circular track about the furnace, at the charging elevation. Later furnaces will probably have charging bells, depending, however, upon the success of this design.

To enable the new charging arrangement to be instituted and to elevate and increase the reducing zone of the furnace, 4 ft. extra hight was added to the furnace stack. It is Mr. Lyon's idea that the trouble from boiling in the crucible was partially caused by unreduced material coming into the crucible of the furnace.

Gases Taken Off Midway of Shaft

The handling of the furnace gases is possibly the most vital feature in the working of the electric-shaft furnace. Much attention has been paid to this at Heroult, and the practice worked out there is different from that of the Swedish experimenters. In the Swedish practice, gases are taken off through the top of the furnace, but at Heroult the greater portion of the gases is taken out at a point midway of the charge in the stack. In this manner, a gas richer in CO is obtained. This gas is cooled so as to be handled by a positive blower and then forced through tuyeres into the furnace. Thus the circulation of heat in the high shaft is stimulated and a reducing atmosphere is maintained further up the shaft. A temperature of 400 deg. C. is deemed necessary to start reduction and 800 deg. C. to complete the reaction.

Tuyeres are introduced at the bottom of the shaft above the electrodes. A by-pass is provided to these tuyeres so that either air or CO may be forced through them. It is figured by possibly adding an excess of charcoal and closely regulating the draft (as to air and CO) a nice control of the operation of the furnace will be made possible. This is the particular aim of all the later experimental work at Heroult.



Charcoal Retorts, Heroult Plant

Production of Pig Iron an Economic Possibility

At the present time it is impossible to give data as to the power consumption of this furnace. However, since the plant is operated on the excess output of the Northern California Power Company it is probable that the power is supplied to the Noble plant at a cost as low as $12 per horsepower-year. It is claimed that the power consumption per ton of pig iron produced at Heroult will amount to only 0.2 kw. per year. This figure is probably low. Charcoal consumption is close to the theoretical amount, and, as indicated, this charcoal can be produced at a minimum cost on account of the utilization of the by-products. If the figures given for power cost and consumption per ton of pig produced, are correct, there seems to be no doubt but that the production of pig iron in the electric-shaft furnace at Heroult is an economic possibility. What practical difficulties are encountered should certainly be solved before long.

In a letter dated at Heroult, Cal., June 18, 1910, Mr. Lyon says: "We have just concluded a most successful run with the furnace, at least so far as the overcoming of the troubles which we had previously encountered is concerned. We had to close down yesterday morning for a short while, due to the fact that the bottom of our crucible burned out, and so tapped itself, but, as such an accident is liable to happen to any kind of a furnace, I did not consider this as a troublesome feature belonging particularly to our furnace, and so am not at all worried about it." The progress of this plant will be watched with extreme interest by a great many scientific men as well as manufacturers on the coast. Account of the utilization of the by-products. Analyses of samples of pig iron produced at Heroult are shown in an accompanying tabulation.

Data on Other Operations

Some instructive data on electric-shaft furnace operation are contained in a report[1] on a furnace at Domnarfvet, Sweden. In these experiments, 2.44 metric tons of pig iron were produced per electric horsepower-year. In the same test the consumption of electrodes per metric ton of pig iron produced was figured at about 5 kg. The consumption of coke was about 605 lb. per metric ton of pig produced.

Professor Von Odelstierna, of Stockholm, Sweden, figures on a comparison of the cost of producing a short ton of pig iron by the charcoal blast furnace and by the electric-shaft furnace. These figures, based on conditions in Sweden (60 per cent. iron ore, charcoal 83 per cent. carbon—no account is taken of the higher CO constant of gases from the electric furnace), show that a saving of $1.55 per ton should be effected in the production of pig iron, by the electro-thermic process.

For the charcoal blast furnace his figures are: Charcoal, 0.95 ton at $8 per ton, $7.60; labor $1; repairs and general expenses $1.50; total $10.10. For the electric shaft furnace: Charcoal at $8 per ton, 0.27 ton, $2.16; 0.213 electric horsepower year at $12, $3.60; labor $1, electrodes 10 lb. at 3c. per lb., $0.30; repairs and general expenses $1.50; total $8.56.

Power at $12 Per Horsepower Year Essential

From all the data available it seems an indisputable fact that pig iron can be produced on a commercial scale in the electric shaft furnace. However, to do this on an economic basis it also seems necessary that power be available at a not greater cost than $12 per horsepower-year. Thus it is evident that for the present the use of the electric shaft furnace cannot be even considered as a possibility at many places in our country. However, as pointed out, conditions at Heroult are peculiar in that hydroelectric power is available at a very low cost. The great need and present high cost of pig iron on the Pacific Coast also act as an incentive for work along this line at Heroult.

The Mississippi State Geological Survey, E. N. Lowe, director, has issued a special bulletin by William N. Logan dealing with the pottery clays of the State. Clays are about the only mineral product so far developed in Mississippi, and the output of clay products last year was valued at about $900,000. It included chiefly brick, pipe and drain tiles.

[1]Report on the "Investigation of an Electric-shaft Furnace at Domnarfvet, Sweden, etc.," By Eugene Haanel, Canadian Department of Mines, 1909.

The Bering River Coalfield of Alaska

The Coal Is of Excellent Quality, and Its Development, Temporarily Held Up by the Government, Would Mean Much to Alaska's Industries

BY L. W. STORM*

The 1200 square miles of territory, known to be underlaid with coal in Alaska, includes two of the most valuable coal areas on the Pacific coast. They are, respectively, the Matanuska field, lying some 50 miles northeast of the head of Cook inlet; and the Controller Bay or Bering River field, 10 to 30 miles inland from the Gulf of Alaska, and 80 miles west of Mt. St. Elias. Of the two, the Matanuska may prove to be considerably the larger, although their areas, as known at present, are about the same. They both contain anthracite and high-grade bituminous coal, but the Bering River field is the better known and will probably be the sooner opened.

The area of available coal in this field is about 75 square miles, occupying an irregular strip 25 miles long and 5 to 10 miles wide. The trend of the strip is a little north of east. Its southern limit is the north shore of Bering Lake, 10 miles inland from Controller Bay, and it is bounded on the east and north respectively by Bering, and Martin River glaciers. The field extends under these ice caps and under large areas of lakes and mud flats and wide gravelly stream valleys, but such coal is inaccessible, for the present, and is not included in the estimate. Mr. Martin, of the U. S. Geological Survey (Bulls. 284 and 335) estimates this coal area at 70 square miles, but since his last visit to the region in 1905, a few scattered areas of coal have been found whose existence was not known to him.

This is a small field when compared with such coal areas as that of Pennsylvania, approximately 200 times as large, but it compares more favorably with the Pacific fields, all of which are small. Moreover, the size and number of the coal seams in this field are unusually large.

The Coal Is of Good Quality

But for one objection, that of its being badly crushed, to which reference will be made later, the Controller Bay coal would be, for all purposes, better than any other now mined on the Pacific coast. The anthracite is of good quality, ranging from 78 to 84 per cent. fixed carbon and is low in ash. Associated with it is a smaller amount of semi-anthracite like that of Pennsylvania. The bituminous, or more properly speaking, semi-bituminous coal, is of the same grade and character as the Pocahontas coal of West Virginia. Characteristic analyses of these coals appear in the accompanying table, together with analyses of other coals for comparison. A number of tests have proved that much of the semi-bituminous coal will make first-class metallurgical coke.

Except in the Matanuska field, there is no other coal of such quality on the Pacific coast. Its crushed condition will injure the anthracite more than the other varieties. The more bituminous coals sinter on the fire, into a crust, which, when broken up, burns freely. They are most seriously injured for domestic purposes. For steaming they are injured but little by their fineness, and for coke making, rather benefited.

where the coal is mined in fairly good lumps, and it may be that well underground the crushed condition may not be so marked, but all of the coal may be expected to suffer more or less from this cause.

Mining conditions will be bad, in general, as a further result of the broken ground. The pitch of the seams, being steep, is some advantage, since the haulage and other working arrangement of the mines can be more readily accommodated to changes of pitch and position than would be the case if the seams were flat. The large number of workable beds close together is another help toward economical working. This will enable a mine to work several seams at once,

ANALYSES OF BERING RIVER AND OTHER COALS.
(Copied from Publications of U. S. Geological Survey.)

Kind of Coal and Where Obtained.	Moisture.	Volatile Matter.	Fixed Carbon.	Ash.	Sulphur.	Fuel Ratio.
Anthracite, average 7 samples, Bering River	7.88	6.15	78.23	7.74	1.30	12.86
Anthracite, one sample best grade, Bering River	3.74	5.41	85.92	4.93	1.10	15.88
Anthracite, one sample, Matanuska	2.55	7.08	84.32	6.05	0.57	11.90
Anthracite, average 9 analyses, Pennsylvania	3.39	3.81	83.79	8.42	0.59	22.33
Semi-anthracite, average 11 samples, Bering River	5.80	8.87	76.06	9.27	1.08	8.77
Semi-anthracite, average 4 samples, Loyalsock, Pa.	1.49	11.07	78.88	7.69	0.86	7.13
Semi-bituminous, coking coal, average 28 samples, Bering River	4.18	14.00	72.42	9.39	1.73	5.28
Semi-bituminous, coking coal, average 16 samples, Matanuska	2.71	20.23	65.39	11.60	0.57	3.23
Semi-bituminous, steam and coke coal, average 38 analyses, Pocahontas, W. Va	0.73	17.43	77.71	4.63	0.62	4.46
Semi-bituminous, steam and coke coal, average 10 samples, Bering River	6.01	8.69	77.45	7.86	0.99	
Semi-bituminous, steam and coke coal, average 53 samples, Georges Creek, Md	0.70	18.81	72.96	7.26	1.01	3.89
Bituminous, coking coal, Connellsville, Pa	1.07	32.70	60.28	5.95	0.81	1.84
Bituminous, average 6 samples, Nanaimo, B. C.	2.12	34.07	55.95	7.93	0.64	1.64
Bituminous, average 9 samples, Roslyn, Wash	2.68	34.37	52.75	9.87	0.24	1.53
Bituminous, average 8 samples, Japan	2.62	42.49	50.07	4.82	0.92	1.18

Cause of Crushed Condition

The crushing is due to the fact that, in late Tertiary time, after the coal had been laid down together with the accompanying 4000 ft. of shales and sandstones, and after an additional 2500 ft. of non-coalbearing formation had been deposited above, the area was raised out of the sea and folded into a complex system of mountains, the tops of which now reach elevations of 3000 ft. or more. A great deal of close folding and overthrust faulting accompanied this movement which has continued until lately and may still be going on. The resulting structure of the coal is foliated and the effect of air and moisture is to slack it to an earthy mass. Frost and local sandslips contribute to the crushing within a few hundred feet of the surface, which is as far as any of the workings extend at present. There are some parts of the field changing about from one to another as changes in position may require. These seams are from 4 to 30 ft. thick. The thickness of a given seam is not uniform. It may locally pinch to nothing or swell to a width of 40 or 50 ft. The principal series of coal beds includes 15 or 20 such seams separated by 20 to 100 ft. of shale and sandstone. It occurs in the upper half of the coal measures. There are several other good seams lower in the formation, but the beds appear to be less numerous, smaller and of lower grade in the lower than in the upper half of the formation.

Estimates of tonnage are more likely to be misleading than not, the knowledge of the field being too limited and the percentage of recovery too uncertain for much accuracy in this respect. For a very rough approximation the anthracite and semi-bituminous may each be estimated at one billion tons and the semi-anthracite

*Mining engineer, Valdez, Alaska.

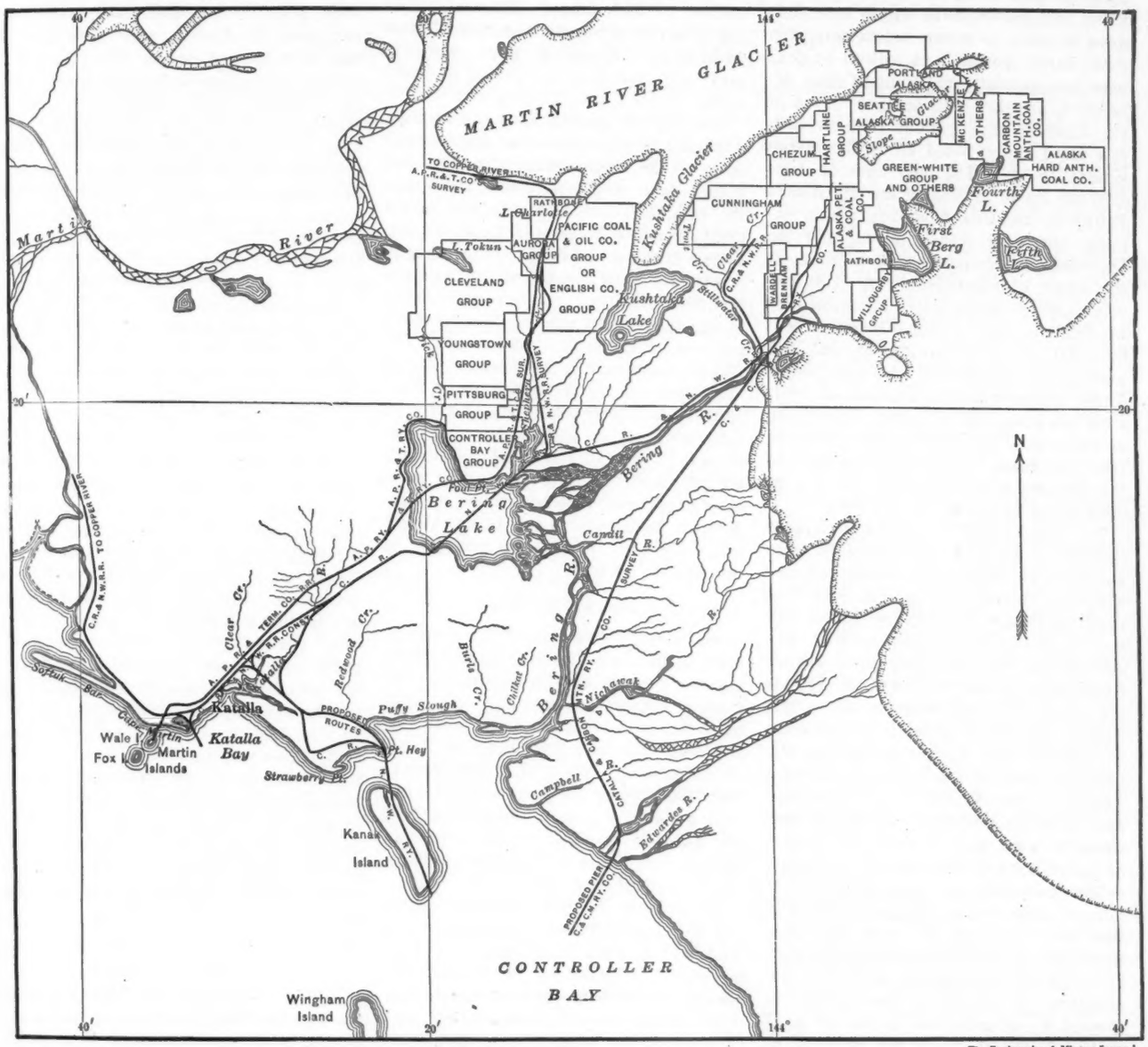
at one-half that amount. The actual quantity of coal present may be greater than this but the amount recovered may be smaller, possibly only one-tenth as much in the case of the anthracite.

Gas and Water Present

Considerable gas is present. There have been a number of accidents from this cause, some of them fatal, although the workings are, as yet, only the merest prospects. Water will also be plentiful in the mines, on account of the heavy precipitation and the badly broken ground. The climate is not severe. This field lies in the coast region of Southern Alaska where the temperature seldom falls below zero. The snowfall is heavy and will be the usual hindrance to transportation. The summers are wet and cloudy.

Transportation, as usual in Alaska, is a serious problem. The difficulty in this case is that there is no really good natural harbor, nearer than Cordova bay, on Prince William sound, 75 miles west of the coalfield, and building from here necessitates crossing the Copper river delta at great expense. There are partial shelters on the coast within 10 or 12 miles of the coal, on Controller bay, Katalla bay, and at the Martin islands, but expensive engineering work, in the way of dredging or building breakwaters, must be done to make a harbor at any of these places and it is not certain that any of them would be entirely satisfactory when finished.

The Copper River & Northwestern Railroad Company, proposing to build to this coal and up the Copper river, spent two or three million dollars in 1907, on railroad work near Katalla and on a breakwater to inclose a part of Katalla bay, but the results of their work on the breakwater were completely destroyed by a storm early in the autumn of that year and shortly afterward the company abandoned this terminus and chose the longer route from Cordova. Their road is now well across the Copper river and on its way up the river to its destination, the Kennicott Bonanza copper mine. This company will probably build a branch into the coalfields as soon as patents to the ground are issued or whenever the Government decides upon any arrangement, under which capital can be induced to open the mines. It is feasible to build this branch, either by way of Katalla, up the Katalla river and on pile trestle across Bering lake, which is very shallow; or by way of Martin river, over a pass 400 ft. high and down Shepherd



The Engineering & Mining Journal

Map Showing Controller Bay Coalfield and Proposed Railroad Connections

creek. The length of the branch from the Copper river to the center of the field will be about 40 miles, and the total distance from Cordova to the same point, about 80 miles.

Only Twenty-five Miles of Railroad Necessary

The length of road necessary to reach the center of the field from any of the local harbors is about 25 miles. This being only one-third the length from Cordova is such a strong inducement that these harbor possibilities will all be gone over very carefully and some of them developed, possibly with success. Five or six different organizations have at various times appropriated terminal sites on Controller bay. The only ones of these who are active at present are the Alaska Petroleum and Coal Company, with a terminal site near Kanak island, and the Oriental Oil Company, with terminal at the mouth of Edwardes river. This bay is an area of shoal water intersected by winding channels of deeper water, caused by tidal currents flowing in and out among the low islands and mud banks. These channels can be dredged out, widened and deepened in places and so used as harbors. They will be well protected from the ocean swell by the islands on the seaward side of the bay, but will be open to the full sweep of the wind.

The Martin islands offer a chance to connect two small islands with each other and with the main land, which, together with the building of an arm extending from the end of the outer island will form a small but adequate harbor. The islands are high and give some shelter from the wind and the terminal grounds are good. The objections raised to this project are that it will be expensive to execute and that the harbor may be difficult to enter or leave during very bad weather. The Alaska Pacific Railroad and Terminal Company, which did considerable work here in 1907, still retains its rights, but has been idle for two years.

The accompanying map shows locations of some of the principal holdings in this field. As will be seen, the Controller bay group is the easiest of access by a railroad entering the field from the direction of Katalla. This group is crossed by at least four seams of good coal, 4 to 12 ft. thick and pitching at about 40 deg. The ground is less broken than it is elsewhere in the field.

Other Coal Holdings

The Pittsburg, Youngstown and Cleveland groups are good only in part. Thev are broken and faulted and crossed by bands of non-coalbearing formation. The Rathbone and Aurora groups are imperfectly prospected, but several good seams show on them. The Pacific Coal and Oil Company group and the Cunningham group, respectively, west and east of Kushtaka lake, are probably the best in the field. They are also the most thoroughly prospected. The outcrops of some 20 or more seams 3 to 30 ft. thick, traverse these groups in a general direction north of east. The dip averages about 40 deg. to the northwest, although there are a good many irregularities, both in strike and dip. Considerable areas, however, in both groups are comparatively free from serious breaks and a number of profitable mines can probably be opened on each group. Successful coking tests have been made, with coal from each group. Especially good coke was made with coal from an opening on Trout creek, on the Cunningham group.

The Chezum ground is, in part at least, underlaid by the same set of seams which show on the Cunningham property. The region east of Canon creek, containing the anthracite and semi-anthracite is the most difficult of access and the least prospected of the whole field. Its topography is also the most rugged and the formation most disturbed. Only certain blocks in this area can be worked. The interests represented in the field are various. The Morgan-Guggenheim syndicate financing the Copper River & Northwestern Railroad is probably interested, directly or indirectly. It is understood also, that several of the railroads having terminals on the Pacific coast are interested here, besides various coal companies and individual capitalists in the United States and elsewhere. There is no monopoly of the field at present.

Location Methods

All projects bearing on the development of this field are held up now, pending the decision of the Government regarding disposal of the land. This has been the condition since 1907, when this coal was withdrawn from entry by President Roosevelt. Most of it had already been filed upon, but patents were withheld pending a careful investigation of the methods followed by the entrymen and also pending a contemplated revision of the mineral land laws.

As in every Western coalfield for the last 20 years, entrymen in filing upon this land have in some cases acted in the interests of corporations or associations, sometimes allowing such parties to use their names for a consideration and agreeing at the same time to deed their holdings to said association after patent has issued. This was contrary to the law, but might have passed unnoticed a few years earlier. However, these claims came up for patent just when certain investigations in Wyoming and Utah and elsewhere in the West, were revealing to the public that the law was being systematically broken and had come to be considered by everyone in the coal business, courts and land office included, as unsuited to industrial conditions, which require that coal land be operated on a large scale.

Patents Were Held Up

Accordingly, the patents were held up and the agitation over them has drawn the attention of the whole country to Alaska. The Cunningham group is the focus of this interest, its owners being especially active in demanding their patents and insisting that there has been no fraud in connection with their entries. Other interests are awaiting the result.

The present coal law allows patent of 2560 acres, or 16 individual claims in one group in Alaska, where the ground had been located before Nov. 12, 1906, and the land office appears to favor issuing patents where comparatively good faith has been shown, even though there have been some minor irregularities. This seems preferable to holding back the patents indefinitely, as the development of Alaska is retarded by lack of this coal, and the danger that those who exploit the field will make more than a fair profit is not so great as has been supposed.

This question of profit is a difficult one. The mining cost of the coal will probably exceed $1.50 per ton, and it must be shipped 1400 miles to Seattle or 2000 miles to San Francisco, in order to reach the main Pacific coast market. Under these circumstances its price will necessarily be higher than that of the local coals and the extent to which its superior quality will enable it to supplant these cheaper coals cannot be foretold with certainty. In this competition, as before mentioned, its friable condition will be a hindrance. Probably there will be keen competition and the Bering river coal may have the advantage wherever a high-grade coal is especially desirable, that is for smithing, steaming, especially for marine use, and for various special uses. In this field it will have to meet some competition with California crude oil. For use in the navy, this coal will probably supersede all other Pacific coast coal and in case of a naval war, the availability of this coal might be of paramount importance to the nation. Bering river coke could probably compete successfully with any in this market.

Importance of Developing Alaska's Coalfields

With reference to the Alaska market the case is different. Opening either the Bering river or Matanuska field would probably result in stopping all shipment of outside coal to Alaska. Coal from Washington or Vancouver island costs $15 per ton retail in Cordova, where Bering river coal will probably cost $5 or $6 when the field is opened. However, Alaska imports only about 150,000 tons of coal yearly. This is less than half a trainload per day and would not justify the expense of building a railroad to the field, but if this coal were available, the development of Alaska would be stimulated and the demand for the coal increased. Railroads and probably smel-

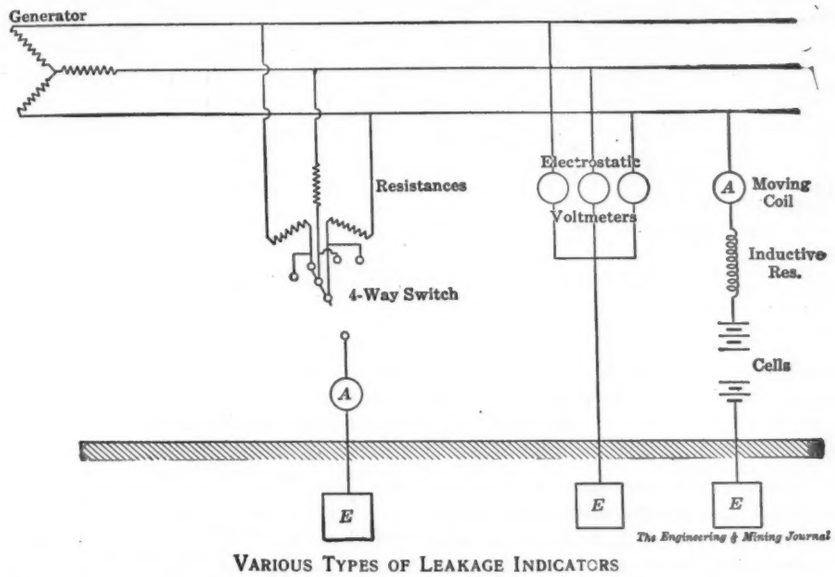
teries would be built and the coal would be used not only directly by these, but also in the various industries and among the people supported by them. In fact, the two railroads which are building in southern Alaska at present are simply in anticipation of the opening of coalfields. These are the Alaska Northern, with terminus at Seward and building to the Matanuska field, and the Copper River & Northwestern Railroad, already mentioned. The latter is not a coal road only. It will open the Chitina copper region, but its success depends upon securing the Bering river coal at a reasonable figure for its use; its construction is in advance of the development of both the coalfield and the copper region from which it is to draw its revenue. Nothing will stimulate Alaska's industries more than the development of her coal deposits.

Earthed and Insulated Neutrals in Colliery Work

SPECIAL CORRESPONDENCE

Discussing this question in a paper before the British Institution of Electrical Engineers, W. Wellesley Wood, tabulated the principal advantages of the respective systems as follows:

Earthed Neutral—(1) Maximum potential to earth of any place limited to 58 per cent. of line voltage.



VARIOUS TYPES OF LEAKAGE INDICATORS

(2) Leakage to earth probably results in isolation of the damaged circuit.

(3) Leakage-tripping devices can be used which switch off the supply when an earth occurs on one phase, reducing danger of shock and explosion.

Insulated Neutral—(1) Danger of shock and explosion is reduced, as contact with earth and one phase does not complete the circuit.

(2) An earth on one phase does not cause an interruption of supply for the same reason.

(3) Stress on insulation under normal circumstances is less and liability to flash to metallic casings considerably less.

(4) Only two-trip coils instead of three are required to protect each circuit where an automatic switch is installed.

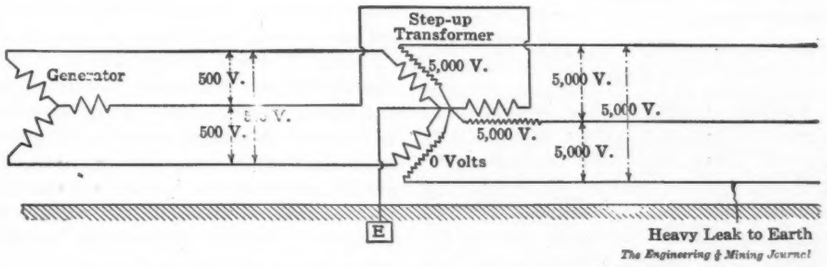
A DIVERGENCE OF OPINION

Mr. Wood says that as far as transmission is concerned the question of earthed versus insulated neutrals is a very open one indeed, especially on voltages under 20,000, and the president of the High Tension Committee of the American Institution of Electrical Engineers puts his conclusions as follows: "That some plants grounded the neutral, and its engineers considered it safe and would never think of running in any other way, while the engineers of plants which did not ground the neutral would never think of doing such a thing." The author proceeds to say that where the neutral is earthed it has sometimes been found possible in emergencies to keep up the supply with two lines and an earth return, while with an insulated system the supply can be maintained with an earth on one phase if the insulation of the system has a sufficient factor of safety to withstand the full-line voltage between any part of it and earth.

Mr. Wood does not think, as regards the generating plant, that the earthing or insulating of the neutral makes much difference, for even with alternators in parallel, triple-frequency currents may give trouble with an earthed neutral; this can be got over by only earthing the neutral of one generator, or by the introduction of choking coils.

INCLOSING ALL LIVE PARTS

The best protection against the danger of shock from conducting bodies does not lie either in the earthing or insulating of the neutral, but in properly protecting or inclosing all live parts and in efficiently earthing to the surrounding grounding all motor frames, switch cases, etc. In a dry pit it is often difficult to get a good earth connection, and thus meet this difficulty. Some engineers carry either a separate cable or care for earthing purposes only, but this method may possibly be a source of danger unless the system is also earthed underground. For example, on a three-phase system with an earthed neutral and an earth plate at the generating-supply end, a leak takes place near the motor on one of the outers. This motor is at work in a more or less insulating stratum, so that the resistance from the ground to the earth plate at bank—except through the earth wire—is very high.



VOLTAGE ON SHORTED-PHASE FALLS TO ZERO, ON OTHER TWO RISES TO FULL LINE VOLTS, INCREASING STRESS ON INSULATION OF TWO PHASES IN RATIO OF 58 TO 100

The motor makes bad contact with the earth on which it stands and there is a very considerable difference of potential between this ground and the motor. Anyone standing on this ground and touching the motor case will possibly get a bad shock. If the neutral is insulated it is necessary to have a leak on one of the other phases at bank before the same conditions can apply. Anticipating the objection that this may be considered an extreme case, Mr, Wood points to such an occurrence recently in a colliery in Scotland, and on measuring the resistance between an earth plate at bank and an earth connection at the bottom of the shaft, this was found to be 300,000 ohms.

Preventing a Flash

Where there is real danger of inflammable gas or coal dust, colliery managers may hesitate to install an electric plant, as an arc or flash with any moderate amount of power behind it may ignite the gas or dust. With an earthed neutral, failure of the insulation of one phase to earth is practically bound to produce such a flash, while with an insulated system an earth on one phase shows on the leakage indicator, and there is a greater chance of isolating the section before any arc occurs.

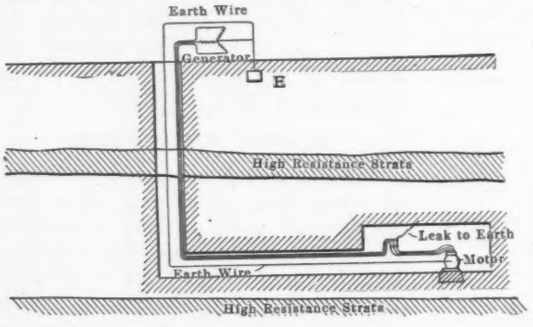
Armored Cable and Leakage Tripping Devices

Leakage-tripping devices are only designed for use on a system with a neutral earthed either directly or through a resistance and the current at which they operate can be adjusted to different values on different feeders as may be required. It is claimed that by using such switches in connection with armored cables, danger from shock and explosion is largely avoided, but Mr. Wood says that while there are undoubtedly many cases in which a leakage device may be of considerable use, there are also many others where it would not justify the increased expenditure and would probably prove rather a nuisance. These devices, moreover, do not protect against shock from live terminals or from contact with a high-resistance leakage.

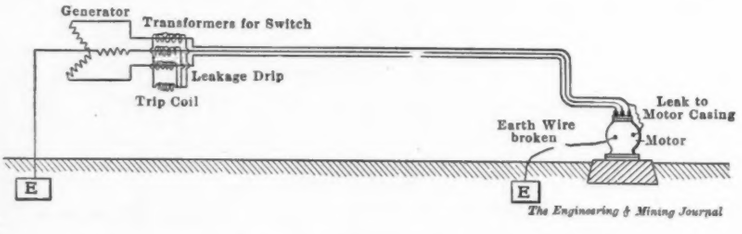
Where automatic oil switches are used, three relays, one in each phase, are needed with an earthed neutral, and only two with an insulated neutral. If many switches are needed the difference in first cost may be considerable. The cost of armored cable is often nearly double that of unarmored, so that these latter cables should be run in places where there is no danger of accidental contact, damage from falls, or of explosion; in such cases armoring is an unjustifiable expense. The cost of maintenance is generally of greater importance than first cost.

Conclusion

In presenting his conclusions Mr. Wood says: "No hard and fast rules can be laid down, and every case should be considered broadly on its own merits, but it seems that generally an insulated neutral is better where permanent plant is at work and the cables are not very liable to mechanical damage. Where portable machines such as coal cutters are used, or where cables are liable to frequent hard usage, it may be worth while to use automatic devices and in this case if a separate transformer were used to supply this plant, its neutral could be earthed and preferably through a resistance without interfering with the remainder of the system. Such devices, however, will require constant inspection. There is another case of importance which has not so far been considered, and that is where small lighting transformers are used. It would seem desirable to limit the secondary pressure of these to 110 volts, and connect the neutral of one side directly to earth.



This Arrangement Insures Considerable Difference of Potential Between Motor and Surrounding Ground, with Possibility of Shock Due to Phase Volts



System with Leakage Tripping Device and Earthed Neutral, Showing Earth Wire Broken, Hence Tripping Device Inoperative. Possibility of Shock to Surrounding Earth Due to Phase Voltage

Coal Consumption in the Philippines

The imports of coal into the Philippine islands, at Manila, in 1909, are reported as follows: French Indo-China, 32; China, 43; Japan, 293; British Borneo, 1601; Australia, 171,866; total, 173,835 metric tons; a decrease of 43,546 tons from 1908. In addition to the imported coal, the supply last year included about 30,000 tons mined on Batan island. Moreover, about 20,000 tons of Pocahontas coal was received from the United States; but that was exclusively for the use of the navy and did not enter into general consumption.

Formerly a considerable quantity of Japanese coal was received at Manila, but that was supplanted by Australia coal during the Russo-Japanese war. During the current year, however, more Japanese coal has been received, owing to the short supply caused by the New South Wales strike during the early months of the year. The advantage which Japanese coal has at Manila, owing to the shorter distance and lower freight, is offset by the better quality of the Australian coal.

The New Coke Plant at Bethlehem

Special Correspondence

Work on the immense new coke plant of the Bethlehem Steel Company, at Bethlehem, Penn., was begun this week. Last fall it was announced that President Charles M. Schwab had entered into a contract with the Deider-March Company, of Germany, to construct an enormous coke plant at Bethlehem. The coke plant will be erected in two sections. The first half will utilize about 40,000 tons of bituminous coal a week, and the second half about 50,000 tons a week. The site of the plant covers 400 acres with a frontage of 2800 ft. along the Lehigh Valley railroad, from which 25 miles of side tracks will be laid to run in the material and take out the product.

The first section of the coke plant will be two years in building and will require 15,000 M. red brick, 25,000 M. firebrick, 250,000 cu.yd. concrete and 1,000,000 yd. excavation.

The main gas tank will be 40 ft. in diameter and 400 ft. high and it will extend 42-in. mains to supply gas to heat all the furnaces in the plant. There will be, however, a large amount of gas, not only enough to run the plant, but to supply the entire Lehigh valley as well, with both illuminating and fuel gas.

NEW PUBLICATIONS

THE QUALITY OF THE SURFACE WATERS OF ILLINOIS. By W. D. Collins. U. S. Geological Survey, Water-Supply Paper 239, 1910.

THE WEATHERING OF COAL. Series of 1909. By S. W. Parr and W. F. Wheeler. Bulletin No. 38, 1909. University of Illinois, Urbana, Ill.

SAFEGUARDS FOR THE PREVENTION OF INDUSTRIAL ACCIDENTS. Edited by David Van Schaack. 50c. Aetna Life Insurance Company, Hartford, Conn.

SUMMARY REPORT OF THE GEOLOGICAL SURVEY BRANCH OF THE DEPARTMENT OF MINES OF CANADA FOR THE CALENDAR YEAR 1909. 25c. Published at Ottawa, Ontario.

TWENTIETH CENTURY HANDBOOK FOR STEAM ENGINEERS AND ELECTRICIANS, WITH QUESTIONS AND ANSWERS, by Calvin F. Swingle. Frederick J. Drake & Co., Chicago.

SCHLAGWETTER-, KOHLENSTAUB- UND SPRENGSTOFFVERSUCHSANLAGEN IN DEUTSCHLAND UND BELGIEN, by Wilhelm Pekorny. Manzsche Universitäts-Buchhandlung, Vienna.

AN ACCOUNT OF THE STRATA OF NORTHUMBERLAND AND DURHAM AS PROVED BY BORINGS AND SINKINGS. North of England Institute of Mining and Mechanical Engineers, Newcastle-on-Tyne, England.

ENGINEERING CHEMISTRY: A MANUAL OF QUANTITATIVE CHEMICAL ANALYSIS FOR THE USE OF STUDENTS, CHEMISTS AND ENGINEERS, by Thomas B. Stillman. Fourth edition. $5. Chemical Publishing Company, Easton, Penn.

DESIGNING AND DETAILING OF SIMPLE STEEL STRUCTURES, by Clyde T. Morris. $2.25. New York, Engineering News Publishing Company.

Contents: Riveting, designing and estimating, manufacture and erection, roofs, plate girder bridges, pin-connected bridges, details of pin-connected bridges.

MONOGRAFIA GEOLOGICA Y PALEONTOLOGICA DEL CERRO DE MULEROS CERCA DE CIUDAD JUAREZ, ESTADO DE CHIHUAHUA, Y DESCRIPTION DE LA FAUNA CRETACEA DE LA ENCANTADO DE CHIHUAHUA, by E. Böse. Boletín del Instituto Geológico de México, No. 25, 1910. Secretaría de Fomento, Mexico.

TABLES FOR THE DETERMINATION OF MINERALS BY PHYSICAL PROPERTIES ASCERTAINABLE WITH THE AID OF A FEW FIELD INSTRUMENTS, by Persifor Frazer and Amos Peaslee Brown. Based on the system of Prof. Albin Weisbach. Sixth edition, revised. $2.50. Philadelphia, J. B. Lippincott Company.

NOTES ACCOMPANYING THE LECTURES ON GEOLOGY APPLIED TO MINING: A COURSE GIVEN AT MICHIGAN COLLEGE OF MINES. By Eugene T. Hancock.

This interesting little book was prepared to serve the purpose of a text book in the course in applied geology in the Michigan College of Mines, a course which emphasizes the structural features and mode of ore deposition in most of the large mining camps of the United States. The book is based upon the best descriptive literature, and is a useful compilation. It can be procured in limited number from the supply room of the Michigan College of Mines.

ORE MINING METHODS, by Walter R. Crane. $3. New York: John Wiley & Sons.

Contents: Support of workings; methods of stoping and handling ore in stopes; mining in narrow veins and bedded deposits; methods of mining in wide veins and masses; open-cut mining; cost of stoping.

The subject matter is presented in a clear and brief manner, and brings together in one volume a general description of the different systems of mining, thus affording an easy comparison. At the end of each section the author sums up briefly and tersely the advantages and disadvantages of the system under discussion. This seems to be one of the most important features of the book. It is to be regretted that in the entire book, no references are given to other literature on the subject. A mining-method bibliography at the close of the book would have enhanced its value.

THE CYANIDE HANDBOOK, by J. E. Clennell. $5. McGraw-Hill Book Company, New York.

This new handbook for the use of managers of cyanide plants, chemists, foremen and assayers is devoted to the fundamental principles of cyanide practice, and is therefore likely to have a greater permanent value than treatises given up largely to descriptions of mechanical details and arrangements at individual plants. The principles of dissolving and precipitating gold and silver do not change, but the mechanical details of practice are still in process of evolution. The entire mechanics of the cyanide process have changed radically within a short period. It would be futile to attempt to designate what is and what is not standard practice, and which of the numerous arrangements is likely to survive a few seasons' trial. Recent improvements in cyaniding, resulting in greater simplicity of plant and the reduction of costs, have practically all been along mechanical lines, yet, as the author states, cyaniding depends upon the application of chemical principles and the chemical aspect of the process has hitherto been treated only in a fragmentary and imperfect manner. Valuable contributions to the knowledge of the subject have appeared from time to time, mostly in the form of scattered papers and addresses before scientific societies, and it is the aim of the present work to bring together this information in a handy and accessible form.

The arrangement of the subject matter is thoroughly scientific, so much so that at first sight the work seems somewhat formidable, but after further examination it becomes apparent that the massing of bald chemical formulas and equations under various heads adds to the clearness of the whole, and facilitates its use as a work of reference. The book is divided into nine parts, each subdivided into sections and numbered paragraphs; so that it is almost as convenient to find a desired bit of information by way of the table of contents as by reference to the index. The first part treats of the history of the cyanide process, besides giving a general outline of the principles involved. The second part is given up entirely to the chemistry of the various processes. Especially interesting in this division is the section on the "Chemistry of the Dissolving Process." In view of the general thoroughness of the work, one is surprised to find only a brief reference to the question of relative electromotive force of minerals in cyanide solutions. Professor Christy, in the *Transactions* of the American Institute of Mining Engineers, and Julian & Smart, in their volume on "Cyaniding Gold and Silver Ores," have shown how important is the part played by the behavior of ions in the solution of the metals, and it would seem that the activity of the last few years should have added something new to the development of that promising field.

The third part treats of the preparation of ores for cyaniding, including crushing and grinding, mechanical handling of material, amalgamation and concentration. In this, as in other chapters, it is evident that the author had no intention to direct the work of the designing engineer, but rather to supplement it. The author never loses sight of his main purpose, viz., a handbook for use in actual practice.

The chapters on metallurgical tests and laboratory operations connected with the daily routine of a plant are given in the fullest detail. Not only are modes of procedure described in their order of sequence, but also practical ways of overcoming difficulties which are to be met in ordinary routine.

The handbook does not add greatly to the theoretical discussion of the cyanide process, but it places in the hands of those engaged in the conduct of actual operations information to meet the daily needs of the plant, and also data for the study of obscure problems along lines where the greatest improvements in cyaniding are yet to be made.

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

J. H. Curle left London, July 22, for a trip to Finland.

F. C. Poisson arrived in London, July 16, from New York.

H. C. Hoover has been in Germany, but has returned to London.

Alfred H. Hale, of Denver, Colo., has been in New York on his way to the Congo Free State.

Prof. Karl Haussmann, of Aachen, Germany, is in Cobalt, Ont., visiting some of the mines.

Charles F. Saviers has returned to Torreon, Coahuila, Mexico, after six weeks spent in St. Louis.

William A. Barber, vice-president of the Socorro Mining Company, has been visiting the mines in New Mexico.

E. E. Burchard has been appointed general manager of the Santa Gertrudis South Company, Ltd., Pachuca, Mexico.

Lionel E. Hill has been appointed assistant to Ernest Levy, manager of Le Roi No. 2, Ltd., Rossland, British Columbia.

William Fleet Robertson, provincial mineralogist, has gone to the Chilcotin district, central British Columbia, on an exploration trip.

Robert K. Painter, of Benson Mines, N. Y., is at the Northern Pyrites mine, Lake Superior Junction, Ont., in which he is interested.

Gelasio Caetani recently inspected the mines of the Tombstone Consolidated, at Tombstone, Ariz., for the Development Company of America.

Neil McL. Curran, for years manager of the North Star mine, at Kimberley, East Kootenay, B. C., has resigned, owing to illness, caused by lead poisoning.

S. S. Fowler, general manager of the Canadian Metal Company, has returned to Nelson, B. C., from conferring with the directors of the company, in Paris, France.

C. L. Hower, of Johnstown, Penn., has gone to Alberta, to supervise development work on coal properties owned by the German Development Company, of Ottawa.

F. M. Kurie, of Philadelphia, has returned from British Columbia, after visiting, as consulting engineer, the properties of the Highlander Mill and Mining Company.

R. J. H. Bradley has returned to New York from the examination of placer ground in the Cook Inlet district and of a copper property at Latouche island, both in Alaska.

Dr. A. Selwyn Brown, consulting mining engineer, has returned to New York from an extended professional trip to Newfoundland and the maritime provinces of Canada.

Captain Desborough, British government explosive expert, has arrived at Ottawa to examine explosives factories and aid the Canadian government in framing the proposed explosives act.

Thomas Kiddie, late superintendent of the smeltery, at Northport, Wash., last month examined a deposit of magnesite at Atlin, B. C., for the Western Steel Corporation, Seattle, Washington.

Fergus L. Allen has resigned his position as superintendent of the Mexico Mines of El Oro, on account of ill health. His successor is David A. Herron, recently at the Tomboy mines, in Colorado.

C. Colcock Jones returned to Los Angeles, Cal., after a stay of several weeks in the Lucky Boy district, Hawthorne, Nev., and then left to examine oil property in the Santa Paula district, in California.

Rudolph Erickson, formerly chief engineer for the Jones & Laughlin interests on the Michigan ranges, has been appointed superintendent of the Davidson Ore Mining Company, which is operating the Gleason mine at Iron River, Michigan.

In a personal note in a recent issue of the JOURNAL we erroneously referred to Bergrath Schneider, of Freiberg, Saxony, as director of the Bergakademie. We should have mentioned him as chief of the metallurgical laboratory of the royal works at that place.

Donald Foster is not in charge of milling operations at the Cherokee Goldfields, Ltd., Parral, Chihuahua, Mexico, as reported by a correspondent in our issue of July 16. Mr. Foster recently arrived from England and is assistant to A. W. Allen, who is in charge.

Hon. Frank Oliver, Canadian minister of the interior, lately arrived at Dawson, Yukon. Starting from Ottawa, he went first to Edmonton, Alberta, thence to the Mackenzie river, and then down that stream 2500 miles to Fort McPherson, on the Arctic ocean. After walking 90 miles over the tundra to the Porcupine river, he proceeded down that river 700 miles to its confluence with the Yukon, at Fort Yukon. The journey thence to Dawson was by river steamer.

Jules Labarthe, who recently resigned as superintendent of the Consolidated Mining and Smelting Company's smeltery and refinery at Trail, B. C., to become manager for the Mason Valley Mines Company, Yerington, Nev., was on July 9, given a valedictory banquet by the citizens of Trail and presented with a handsome silver tray made from the product of the local refinery. Mr. Labarthe was at the Trail works 13 years.

OBITUARY

H. Lawrence Read died in New York, July 29. He was well known in Mexico as a prospector and promoter. He was in New York temporarily on business, his home being in the City of Mexico.

I. N. Welch died at Central City, Colo., July 19, after a long illness. He was for many years the faithful and trusted correspondent of the JOURNAL, in the Gilpin and Clear Creek county mining fields.

William D. Rees, for 25 years well known in the iron-ore and vessel trades at Cleveland, Ohio, died at that city, July 22, aged 63 years. As a young man he was interested in iron mining at Marquette, Mich. Mr. Rees was for a number of years president of the Republic Iron Company, whose iron mine on the Marquette range is historic in the Lake Superior region. Its specular ore was the standard of Lake ore values in the early days. The property is now owned by the Cambria Steel Company. Mr. Rees was also connected for a time with the Lake Superior Iron Company, which in 1901 was acquired by the United States Steel Corporation. The management of the Republic Iron Company's ore and vessel properties was transferred to M. A. Hanna & Co. several years ago.

W. H. Sweet died, July 21, at his home in Saxton, Penn., aged 62 years. He was one of the best known of the central Pennsylvania operators and was always prominent in the conferences with the miners' union. He started to work in the Broad Top field when he was 11 years old, and spent his entire life there. He was a good deal of a philanthropist and gave liberally of his means for educational and religious objects in which he was interested. At the time of his death he was vice-president of the Saxton National Bank and the Carbon Coal and Coke Company, a director of the First National Bank of Huntingdon, and the Raystown Water Power Company, and a trustee of Dickinson Seminary, of Williamsport. He will be greatly missed by the miners whom he employed.

SOCIETIES and TECHNICAL SCHOOLS

Association of Consulting Engineers—At a meeting held in London, England, July 13, it was resolved to form an association of consulting engineers, the object being (a) to form a recognized group of independent consultants who would constitute a body for the protection of their interests and the interests of the public generally; (b) to improve their status and professional position. A provisional committee was chosen, the secretary being A. H. Dykes, whose address is 1 Victoria street, Westminster, S.W., London, England.

EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on Important Events From Many Important Mining Centers of the World

San Francisco

Aug. 1—In view of the temporary overproduction of oil in this State and the number of oil producers not under contract who are looking for profitable contracts, a movement has been started by some large consumers of oil around Los Angeles, to combine to buy their oil in bulk direct from these producers and eliminate the "marketer." It is proposed to form a company of these large consumers and enter into contracts with producers for all the oil needed by the membership for a term of years at an unvarying price. By doing this they will not be at the mercy of fluctuations of the market and can fix stable rates with their patrons. Quite a number of large oil-consuming corporations are joining in this new movement.

Another lot of oil producers not connected with the Independent Producers Agencies are planning to combine in order to insure a more stable market when their present contracts expire. The present Independent Producers Agency will not agree to sell any specified quantity of each producer's oil at any fixed price. They think that a combination of producers working under a single form of contract for a certain minimum quantity and a fixed price at the well, will be more satisfactory than the present arrangement, because they will be independent of fluctuations of the market and will know exactly what they will receive, and how much they can sell, while the contract lasts. The new movement is expected to result in profit to those who begin it.

The flow of the big Lakeview gusher is slowly but gradually diminishing. In the early part of this month it was noted that the flow had fallen from 40,000 to 32,000 bbl. per day, and it is now between 30,000 and 31,000 bbl. Nearly 2 per cent. water is now coming with the oil but this is supposed to be surface water.

Trouble is experienced on the west side of the San Joaquin Valley oilfields with claim jumpers, some of whom are armed. The governor was appealed to by some whose claims were jumped and he has assured them that in case the sheriff of the county does not protect their property, he will send soldiers.

Surveyors have taken the field to make surveys for the Humboldt & Eastern Railroad, which is to connect Eureka, Humboldt county, with either Redding, Shasta county, or Red Bluff, Tehama county. The activity began immediately on receipt of the news that the forest service would sell a billion feet of timber along the proposed route at $1 per thousand feet. This new road will cut across Trinity county, which has at present not a single mile of railroad, but has large undeveloped resources. Its completion should have a marked effect on the mineral resources of the county, which have always suffered from lack of transportation facilities, all hauling having to be done by team and greatly adding to expense of mining operations.

Denver

Aug. 1—Interest continues unabated in the new gold camp of Beshear, near Georgetown, in Clear Creek county. Hundreds of prospectors are said to be at work in the new district, and surveyors are busy running out the lines of the claims staked. Steps are being taken to organize a mining district, so that all locators may secure a "square deal," and to prevent claim jumping. Three to five inches of free-gold ore are said to have been discovered in the breast of the southeast drift on the Nelson vein, owned by the Bard Creek Mining Company, at a point 370 ft. in. Another discovery is reported as having been made in the Homestake tunnel, the ore assaying 14 oz. gold and 8 oz. silver per ton.

Arrangements have been made to blow in the new Kuenzel smeltery at Buena Vista soon. Several thousand tons of crude ore and concentrates are on hand at the works awaiting treatment. Much interest attaches to the first run on a commercial scale of this new method of ore reduction.

Salt Lake City

Aug. 1—The Yampa smeltery, at Bingham, according to an announcement made by Superintendent Murphy to his men, will close. The plant has been handling from 700 to 800 tons of ore daily, and employing about 200 men, one-quarter of whom are foreigners. No reason is given for the closing down. The mine will continue to run and will ship to Garfield. It is probable that it has been found cheaper to ship the sulphide ores direct than to convert into matte and ship this product.

The "mine-salting" case which has been in hearing at Ogden recently has been granted a continuance until the defendant and his attorney decide on the matter of introducing testimony. Charles Bauer is charged with "salting" the Golden Rule mine, at the mouth of Ogden cañon, with high-grade ore, and with selling stock to several persons upon representing to them that samples of ore which he delivered for assaying were typical of the ore in the mine. The defendant asked that the court dismiss the case on the ground that the State failed to prove that the mine had been "salted" by Bauer, or that the defendant had any intention of defrauding those to whom stock was sold. The judge has refused to dismiss the case.

Much coal, petroleum and phosphate land in this State has been withdrawn from entry by order of President Taft. Practically all the coal lands not heretofore classified were withdrawn, but provision is made for agricultural entry under certain circumstances. The petroleum withdrawals are in San Juan, Iron and Washington counties, and include most of what is known as Petroleum Reserve No. VII. The withdrawal went into effect July 2. The phosphate lands, which were also withdrawn on this date, embrace several thousand acres in Rich, Morgan and Weber counties.

Fire was started in the Tooele plant of the International Smelting and Refining Company, July 25. The fire was lighted by Governor Spry in the first of the five reverberatory furnaces. The second reverberatory furnace is practically complete, and the three remaining are so nearly completed that they will be in readiness to be blown in as needed. It is expected to have the converters in operation early in September. In the mean time the furnaces will be put in good working order, and ore and matte will be accumulated. Trying out of some of the machinery is in progress.

Goldfield

Aug. 1—The control of Jumbo Extension has been sold. Thomas G. Lockhart, who has been in control since the foundation of the company, has sold his entire block of 500,000 shares and within a short time the board will be reorganized with the new owners in control. The property includes two groups. In Goldfield are the Gold Wedge, Poleverde, Vinegarone and Dick Bland fractional claims, and in Diamond field are the Gold Coin, Saddle Rock, Three Friends, Three Friends Fraction, Black Butte No. 1 and Black Butte Fraction, in all 110 acres. Development work to date has been done almost entirely by leasers, but ore has been opened in a dozen different places and royalties amounting to about $50,000 have been paid.

On the Vinegarone ground possibly

$1,000,000 worth of ore is in sight, which, according to an agreement with the Consolidated company, is to be mined and milled by the latter company, the net profits to be equally divided. It is expected that the new management will order this work done at once, using the income derived to defray expenses of extensive operations planned.

Butte

July 29—At the adjourned meeting of Butte & Superior stockholders, July 21, at Duluth, the plan for refinancing the company was carried by a large majority. A. M. Chisholm, Norman E. Lamond and J. A. McDonald filed a written protest against holding the meeting upon the ground of illegality of the proceedings and it is possible that the matter will be taken into court. Mr. Chisholm's idea is that instead of bond issue some arrangement should be made with some large zinc-consuming concern by which the production would be taken care of and liabilities met.

The petition of the Monidah Trust Company for a court order allowing it to inspect the workings of the Anaconda company's Original mine has been granted. The Trust company, which owns the Fashion lode claim, adjoining the Original, alleged in its petition that ore from the Fashion lode was being mined through the Original.

Wallace, Idaho

Aug. 1—Four hundred square miles of land around the head of the St. Joe river, in Shoshone county, will be surveyed by the U. S. Geological Survey to determine if the land is mineral bearing or non-mineral. A force of 15, under Hoyt S. Gale, of Washington, is here to start the survey. The land was formerly part of a Northern Pacific railroad land grant, but was declared mineral bearing in 1905 and open to mining location. Many prospectors have taken up lode and placer claims on the ground. The Northern Pacific company protested and the present survey is the result.

A 7-mile lode, whose existence was unknown, has been discovered near West Eagle creek. The lode is under several feet of dirt for the entire distance and was found by chance. It carries copper.

Duluth

Aug. 1—Much exploratory and development is in progress in the Cuyuna district in Minnesota. The operations have now extended over a large area. The first producer is the Kennedy mine at Rabbit lake, the fee of which is owned by the Orelands Mining Company, G. H. Crosby and William Harrison. It is four miles northwest of Deerwood and 3½ miles from the new town of Crosby. The Kennedy is located on the so called "north range." Work at this property was started by the Rogers-Brown interests 2½ years ago. The shaft is down between 300 and 400 ft. Much lateral development has been carried on and a stock pile of some 50,000 tons of ore has been accumulated. The Rogers-Brown lease calls for a minimum production of 100,000 tons a year, with the property developed. The capacity of the shaft is much larger than this. Rogers, Brown & Co. are developing a second mine in sec. 2-46-29, adjacent to the town of Crosby. The Orelands company controls 700 acres. Cuyler Adams is its president. The Brainerd Mining Company has 900 acres. This land has been leased to a steel consuming concern and is being explored. Drills also are at work on the properties of the Salisbury and Agate Lake Mining companies. The C. M. Hill Lumber Company, of Saginaw, Mich., is exploring the Thomas Feigh lands in sec. 16-46-29, and is said to have located an extensive deposit. Drills are, in fact, at work in every direction on the Cuyuna. The showing in general is reported encouraging.

The U. S. Steel Corporation, which a few years ago penetrated the extreme western portion of the Mesaba iron range with its Duluth, Missabe & Northern Railroad, is preparing to enter the extreme eastern portion of the range in similar manner. Its Duluth & Iron Range road, the present terminus of which is at the Spring mine, is to be extended ten miles or more to the east. The extension will tap a large belt of timber owned by the Steel Corporation and other interests, and it also will open considerable areas of mineral land. Much of the mineral lands are held under option by George A. St. Clair and his associates. These holdings aggregate some 10,000 acres. The lands will be explored, and with strong likelihood that a number of mines will be developed. The presence of ore has long been known, but on account of the inaccessibility of the district very little exploratory work has yet been done.

Cobalt

Aug. 1—The Provincial government will recommend to the legislature that permission be given a syndicate to build an electric road to the Porcupine district, to start from near Matheson. The application for the charter will be sent to the legislature in the form of a Private Bill and the cabinet will recommend that it be passed. In the meantime the road may be built. Work on it will be started immediately. The distance is 30 miles. At the present time water transportation, even by canoes, is becoming difficult. In order to raise the water in the river, a dam was started. Work on this was stopped by an order from the Dominion government and an engineer has been sent up to look into the matter.

Samples of free-gold ore have recently been brought in from the country near Fort Matachewan. Considerable staking has already been done and a good deal of work will be accomplished this summer. Plans are under way for the formation by the Timmins interests of the Alpha Gold Mining Company, with a capital of $3,000,000, to take over the four Hollinger claims. Rich ore is being obtained at the 100-ft. level of the main shaft, where the vein is 10 ft. wide. A 100-ton mill is to be constructed.

Government returns for the first half of 1910 show that two-thirds of the Cobalt production was treated in the United States. The distribution is as follows: United States, 9816.70 tons, 66.13 per cent.; Canada, 4782.63 tons, 32.22 per cent.; England, 153.65 tons, 1 per cent.; Germany, 90.10 tons, 0.65 per cent. Notwithstanding the much larger tonnage treated in the United States, the Canadian smelteries treated practically 75 per cent. of the total production of silver. This is due to the fact that all of them on this side of the line handle only high-grade ore. Twenty-seven mines shipped ore during the first six months.

Toronto

Aug. 1—The Canadian Geological Survey has received a report from E. G. McConnell, who was commissioned to investigate the alleged discovery of a mountain of gold-bearing quartz on Bitter creek, Stewart, B. C., in the Portland canal district. He states that while the vein matter in the mountains was abundant, the metal contents so far as known are so low that it is still doubtful whether they could be extracted at a profit. The ore occurrences are, however, promising enough to justify some expenditure in exploration. The mountain has not been thoroughly prospected, in fact much of it could only be prospected with the aid of a balloon.

Reports of rich discoveries come from what is known as the Cripple Creek district lying west of the Metagami and Lost rivers, and extending in a westerly direction as far as a chain of lakes in Denton township, all in unsurveyed territory. The first find was made in May, but later discoveries, which are said to be richer, have created much excitement in Porcupine and many prospectors are going into the district. A large number of claims have been staked. The formation is described as being similar to that of Porcupine, schist, porphyry and quartz running into granite formation on contact. Most of the rich showings are from contact veins.

Preliminary steps have been taken toward the formation of a company to develop an iron-ore deposit, reported to be of considerable extent, on the St. Maurice river, 26 miles from Three Rivers, Quebec.

THE MINING NEWS

Reports of New Enterprises, New Machinery, Installations, Development Work and Property Transfers. The Current History of Mining

Alaska

Mt. Andrew—This iron and copper mine continues to be one of the big producers of the Ketchikan district, the shipments to date amounting to 55,000 tons, which have gone to Ladysmith. Henry Ballou, superintendent, has 127 men at work.

Arizona

Gila County

Miami—The company has laid off 150 men from its underground force, and much of the underground work has been discontinued. The reason given for the curtailment is that the mine is already in condition for production on all the levels and sublevels above the 420-ft. haulage level. Stoping will be commenced on the 420-ft. level. Rapid progress is being made in the construction of the concentrator, and within four or five months milling may be commenced.

Globe-Arizona & El Paso—This copper company, the new corporation which recently took over 20 claims belonging to the Dixon Copper Company, 9 miles west of Globe, has just taken a bond and lease on 25 other claims belonging to Matteo Giacoma, contiguous to the Dixon. The purchase price is 75,000 shares of stock in the Globe-Arizona company.

Live Oak—Three churn drills are at work on the property. The churn-drilling program now being carried out at the Live Oak is expected to block out, in 200-ft. squares, the central part of the orebody. When the underground work is resumed, drifts will be driven along the coördinate lines on which the drill holes have been put down. By following this plan, the churn drilling serves to direct the course of the drifting, and the various holes sunk will afford excellent ventilation for the underground workings.

Warrior—Ore shipments are being maintained at the rate of 80 tons per day. This ore is shipped from the Miami terminal of the Arizona & Eastern to the Old Dominion smeltery. The average copper content is 10 per cent.

Mohave County

The work of the last six months in the development of the holdings of the U. S. Smelting, Refining and Mining Company in this country is reported satisfactory. At the Banner and Champion drifting and crosscutting are being carried on while sinking is being continued at the Silver Legend, Bryan, Summit, Twins and Tennessee At the last named mine, the new shaft has not yet reached the vein, but the milling ore in the old workings and on the dumps insure a certain production for a long time. The concentrating mill, separators and smeltery additions at Needles, are rapidly nearing completion and are expected to be in operation about the middle of September. The lead furnace is in commission.

Ruth and Rattan—These mines in the Silver Creek district were sold to a group of easterners headed by E. B. Van Deman, of Jacksonville, Fla. The new owners propose starting active work about Sept. 1. The 10-stamp mill on the river will be moved on the ground and together with all mine machinery will be operated by electric power from the Kingman plant, and a cyanide plant added.

Marietta—This company, at Chloride, has made a shipment to Needles. A 150-ton mill is planned. Frank L. Rodgers, of New York, is president.

Yuma County

Planet—This Lewisohn property has a double-compartment shaft down 600 ft., and has done 1100 ft. of drifting. A branch railroad from Parker is planned.

California

Amador County

Stowers & Allen have started a tailing plant on Jackson creek to catch the gold which has been set free by oxidation extending over a period of years. A new plan is being adopted.

Bunker Hill—In the last six months' work of the mill at this mine, Amador City, 17,793 tons of ore were worked and the average yield was slightly over $8 per ton, including gold from the sulphides.

Calaveras County

Utica—This company, at Angels, is completing a 40-stamp mill for the Gold Cliff mine.

Nevada County

Lily Consolidated—This company has been incorporated with its principal place of business at Nevada City. The property is near the Mitchell or old Pat Hall ranch. The company which recently held the bond relinquished it and this new one has taken the ground. C. M. Wilson and F. C. Longe are among the directors.

Erie—At this mine, Graniteville, R. G. Eckis, manager, extensive underground development and surface improvements are being carried out. The mine has a 30-stamp mill and this is to be enlarged. New concentrators are being put in.

Placer County

Annie Laurie—R. H. Young is about to develop the shoot he struck in sinking the shaft at this mine two years ago.

Big Dipper—From this old drift mine at Iowa hill, owned by the McGeachin Mining Company, J. E. Rose, superintendent, very rich gravel is being taken out. Forty men are at work on the property. A number of good strikes have been made in the Iowa Hill section recently.

Shasta County

First National Copper—The Shasta County Farmers' Association, at a meeting July 30, came to an agreement to demand that the Balaklala smeltery be closed. Manager White has been granted until Aug. 2 to finish matters on hand preparatory to a shutdown until October, or until the completion of the Cottrell process designed to correct fume troubles. The company will accede to the demands of the farmers.

Sierra County

Bullion—Charles R. Thompson, who has a bond on this mine west of Sierra City, has put on two shifts.

French—In this gravel mine near Howland Flat, S. Featherstone has made an excellent strike.

Standard—New machinery has been placed on this mine in Sailor Ravine, near Downieville, for deeper sinking. High-grade ore is being sacked and shipped.

Sovereign—A new vein has been found in this property at Ladies Cañon, near Downieville. It is on the Helen location.

Blue Channel—The gravel being washed from this claim at Bunker Hill is taken from the rim of the channel. The main tunnel is being run ahead through lava.

Gladstone—A double force of men has been set at work on the rich vein recently uncovered in this mine. C. M. Root, manager.

Sixteen-to-One—Work has been resumed on this mine at Alleghany, under management of H. L. Johnson, of the Tightner mine. J. G. Binning is superintendent. The mine has been idle on account of litigation, but difficulties have now been arranged.

Siskiyou County

Dun & Vanderlip—A hydraulic elevator is being installed at this mine, at Scott Bar.

Red Ant—This mine, near the Mono,

owned by Alex Rosborough, is now shipping to the mill at Yreka.

Black Bear—Twenty men are now at work on this mine, under supervision of John Daggett, and one of the old shafts is being cleaned out preparatory to prospecting.

Northern California Dredging Company—This company has installed an "orange peel" dredge at the upper end of the dredge at Hamburg, to loosen up gravel and remove large rocks.

Pluto—At this property, Snowden, Russian creek district, the work on the Homestake is being carried on under supervision of John F. Boyle. High-grade ore is being sent to the mill.

TRINITY COUNTY

Wagner—After a period of idleness this mine, near Carrville, has resumed operations and the tunnel is being extended.

Dorleska—This mine, under lease to M. W. McIlwaine, at Dorleska, recently showed up good ore in a new section. The mill is being operated on ore from the old dumps at a profit. A crosscut from the tunnel to the old Prescenti works is planned.

Headlight—At this property, Carrville, owned by the Trinity Mining and Reduction Company, it is intended to add 60 stamps to the present 40-stamp mill. The orebody is about 90 ft. wide. A 9000-ft. ditch is nearly finished, and in this a wooden flume will be laid. David Goodale is manager.

Colorado

CLEAR CREEK AND GILPIN COUNTIES

California—This old mine on Quartz hill, the deepest in the district (2200 ft.), will be connected with the Newhouse tunnel to drain it.

Mint and New System—These Empire properties will be consolidated. A 10-stamp mill has been started at the Mint. Robert Temple is in charge of the sinking of a 500-ft. shaft. Frank Straub is manager.

Neptune—Active work has been started on this Fall River property, by C. F. Cabeen. An electric hoist will be installed.

LAKE COUNTY—LEADVILLE

Ella Beeler—The new building on this property is nearly completed, and underground work will be started soon.

Helena—In about 10 days the shaft on this claim should be drained, the water now being below the 300-ft. level. The guides for the cage are being placed as fast as the water recedes, so active work can be started at once when the shaft is drained.

Penn—This property is shipping from 4000 to 5000 tons per month; it is being operated by several sets of lessees.

Castle View—This mine, under lease to Nicholson, Keeler & Swanson, is shipping from 50 to 100 tons of ore daily to the smeltery.

Gold Basin—This mine, down the gulch from the Ibex, is shipping about 300 tons per month of ore carrying gold and silver.

Miller—Surveyors are at work in Lackawanna gulch on the site of the 20-stamp mill to be erected by this company. Arrangements are also being made for the early installation of the aërial tramway from mine to mill.

Fanny Rawlins—The shaft on the north end of this property, recently leased to the St. Louis Tunnel people, has been unwatered, and the work of sinking another lift of 75 ft. is under way.

SAGUACHE COUNTY

Gold Hill United Mines—The company has been listed on the New York Curb; capital, $2,000,000 (par $1), of which $1,800,000 is outstanding and the balance in the treasury. Thomas K. Ober, of Philadelphia, is president.

SAN JUAN DISTRICT

Barstow—It is reported that this property, Ouray county, is to be reopened, after an idleness of several years. The property is extensively developed and in the past produced 150 tons of ore per day.

Red Mountain—An Eastern mining engineer is examining the properties of this concern in Ouray county, but whether for intending purchasers or present stockholders, it is not known. The company has paid off some of its creditors lately, and this is taken as an evidence of the early starting up of operations.

Wanakah—The upper terminal of the tramway has been completed and work is now under way on the lower, at the American Nettie mill, at Ouray, which is being overhauled to treat the ore from the Black Diamond and Ironclad mines. A large ore reserve has been created, it is said, and is awaiting the completion of work on tramway and mill.

Carbonate Queen—The owner of this property, near Ironton, is reported to have made a strike of 12 in. of ore within 50 ft. of the surface, carrying 60 oz. silver and 40 per cent. lead.

Frisco—At a meeting of the shareholders in Pittsburg, financial arrangements were effected whereby the property, located near Animas Forks, San Juan county, will be reopened and worked during the coming winter. Immense bodies of low-grade ore are said to have been exposed by the Bagley tunnel, the principal working, but a mill will not be built until the continuity of the orebodies is proved by this further development work. Charles Gagner, who was in charge when work was suspended over a year ago, and lately on the Gold King, will be mine manager.

Revenue—It is said that this property, at Ouray, is steadily increasing its output under the gradual addition being made to its working force, and has now become one of the foremost gold producers of Ouray county.

Atlas—Within a short time this mine, at Ouray, is expected to produce sufficient ore to keep the mill in operation 24 hours *per diem*. Connection with the San Pedro workings will be made soon, affording good ventilation in addition to rendering available a large ore reserve.

Calliope—A strike of copper-silver ore is reported as having been made in this old-time producer, at Ouray.

Camp Bird—The June returns are: Crushed 7070 tons, yielding 6858 oz. of bullion and 773 tons concentrates; cash receipts, $175,055; expenses, $61,718, leaving net operating profit, $113,337.

TELLER COUNTY—CRIPPLE CREEK

Isabella—Machinery has been purchased and is being installed at the Empire State shaft, to replace the plant destroyed recently. This property is being operated under lease to the Western Investment Company.

Millionaire—This name has been given to a three-quarter acre fraction just discovered and staked, located on Bull hill, between the Acacia and Isabella properties.

Anchoria-Leland—It is rumored that the management is considering the erection of a mill at the property on Gold hill, Cripple Creek, to treat its low-grade ore by the so called Portland process, or else to arrange for the treatment of this ore at the new Portland mill, on Battle mountain. The properties have been worked lately under the leasing system, but now the deep-drainage tunnel is nearing completion, by which means it is expected the lower workings will be drained, resumption of work on company account is contemplated, at least at the deeper levels.

Golden Cycle—It is rumored that H. D. Muir, of Salt Lake City, has completed his examination of the mine for the parties holding the option of purchase.

Nellie V.—After having been idle for several months, this mine, in Squaw mountain, is again preparing a shipment of high-grade ore, it is said. The past production is about $80,000, some ore yielding over $1100 per ton having been shipped.

Black Belle—Sub-lessees of the Union Leasing Company have made a shipment from the shoot recently encountered at the 350-ft. level of the south shaft, the ore being sylvanite, and of 2- to 3-oz. grade.

Idaho

CŒUR D'ALENE DISTRICT

Missoula Copper—The west drift has followed the ore for 20 ft. since the strike was made and 3 ft. of copper ore is showing. In with the copper is galena.

Reindeer—The first shipments of copper ore have been sent to the Tacoma smeltery. The mine has opened up large bodies of shipping and milling copper ore during the last four months.

Snow Storm—This company, owning the only dividend-paying copper mine in the Coeur d'Alene, has held its annual meeting and elected officers as follows: T. L. Greenough, of Missoula, Mont., president; J. B. Greenough, of Spokane. Wash., vice-president; C. A. Mowry, of Larson, Ida., secretary; H. E. Cheney, of Missoula, treasurer; I. T. Hosey, of Phoenix, Ariz., J. H. Howard, of Rawhide, Nev., and J. C. Broad, of Spokane, directors.

Caledonia—The payment of dividends has been stopped by this new lead-silver producer until the treasury surplus is sufficient to finance the driving of a 3000-ft. tunnel and the construction of a mill, both of which are expected to be completed early next summer. The company has paid three dividends, amounting to $52,100, since becoming a producer last spring.

IDAHO COUNTY

Del Rio—Advices from Stites are that negotiations are under way between a French syndicate and John Massam, of Elk City, for the purchase of the Del Rio mine, on American river, near Elk City. Adolph Chalas, of Philadelphia, and Louis Vanzac, of Paris, with W. T. Birdsall, of Spokane, have been at the property making an examination.

SHOSHONE COUNTY

Nabob—Harvey M. Ross, manager of this mine, near Kellogg, reports that all the machinery has been installed and that work on the tunnel will be resumed. The shaft is at 365 ft., with drifts from the 100-, 200-, and 300-ft. levels.

Kansas

Tiawagh—The mill of this company at Galena was blown down by the recent storm. This mill was moved to the mine from Miami.

Eureka—A. O. Ihlseng has disposed of his holdings in this company and given up the management, and has been succeeded by Robert Ping, of Galena. The operation of this mine is anxiously awaited by the entire district as it is the first real development in the Kinderhook ore beds.

Kentucky

BELL COUNTY

Asher Coal Mining Company—This new company, at Wasioto, has begun work on the development of 30,000 acres of coal which it owns. It is at present shipping three cars per day. L. A. Osborn, of Wasioto, is engineering in charge of construction. Officers of the company are T. J. Asher, president; H. H. Asher, vice-president; Robert Asher, secretary and treasurer.

WOODFORD COUNTY

Central Kentucky Phosphate Company—This company has been organized at Lexington, to develop mineral deposits in the vicinity of Versailles. Its incorporators are E. C. Bowman, Winston-Salem, N. C.; W. B. Alexander and L. H. Baker, Birmingham, Ala., A. B. Rumley, of Kankakee, Ill.

Michigan

COPPER

Winona—This company has called an assessment of $1 per share, payable Aug. 9, to pay for its half of the stamp mill that is being erected jointly by this and the King Phillip ompany. There have been several delays in the delivery of the machine for this mill, and as a result it is not likely that it will be ready until near the end of the year.

Contact—The company has moved its drills to 1500 ft. northwest of the No. 1 hole, which was in the eastern portion of the tract and was driven into the sandstone for 500 feet.

Ahmeek—The drill at the 900-ft. station of the new Nos. 3 and 4 shafts has cut the Kearsarge lode at 200 ft. down. The lode was found in place, of average width and well mineralized. These two shafts are down 960 feet.

Isle Royale—A crosscut eastward from the 700-ft. level of "A" shaft has exposed a copper-bearing amygdaloid lode, but as yet it has not been opened to determine its extent or worth. Work on the Isle Royale lode at the main property continues on a limited scale and with paying results.

Franklin—The company has discontinued all drill work in search for the Hancock lodes, without results. The drift from the fifteenth level, between No. 1 and No. 3 shafts, has been holed through. This will afford much improved ventilation and greatly facilitate the underground work.

White Pine—This Calumet & Hecla property, in Ontonagon county, has encountered copper sulphide and red oxide. The company is sinking a vertical shaft to open up lodes proved by diamond drilling. The discovery of sulphide and oxide ore was made in a lateral extended from this shaft. The ore is of a different character from that at Algomah, the latter being black oxide and chrysocolla.

LaFayette—Engineers are examining the property in the Porcupine mountains of Ontonagon county. It was bought some time ago by the Copper Crown Mining Company, of St. Louis, which had previously acquired the Norwich, Hamilton and other properties in Ontonagon county. Later the LaFayette was sold by Copper Crown to Milwaukee interests, who are now having the examination made. There is possibility of work being undertaken there later.

IRON

A prospective producer on the Gogebic range is one that Ferdinand Schlesinger, of Milwaukee, operator of the Newport mine at Ironwood, plans to open to the north of the Palms property, in the Bessemer district. The tract consists of eighty acres and is owned in fee by the County of Houghton. Exploratory work has been in progress with such satisfactory results that the Schlesinger interests have leased the property and have agreed to expend $250,000 in its development within the next five years. Operations at the Graham Nut and Bolt Company exploration at the Catherine, Michigamme district of the Marquette range, have been hampered latterly on account of the destruction of the engine house by fire. A similar loss has been sustained by the Independent Iron Company at the Spencer property, near Iron Mountain, Menominee range. Both structures are being rebuilt.

The New York State Steel Company is preparing to open two new mines in the Iron River district, at the western end of the Menominee range. These are the Gleason property, in sec. 23-43-35, and the Goodman, in sec. 14-43-35. The tracts are a short distance north of Iron river and near the St. James mine. Exploratory work has been in progress for a considerable time and large deposits have been found. The sinking of permanent shafts will be started soon.

Minnesota

North American—The concrete shaft at Tower being sunk by the Foundation Company is down 60 ft. and progressing nicely.

Fort Henry—The concrete circular shaft of the Woodbridge mine, of this company, at Buhl, is bottomed on ore and is being resealed

Section 30—This company, at Ely, installed a Corliss compressor and other equipment.

Chandler—This mine, at Ely, formerly operated by the Oliver Iron Mining Company, is being reopened by private capitalists. The mine has been idle about six years.

Missouri

Newata—This company has bought the 20-acre lease on the Baker land at Duenweg from Mrs. D. V. Scholl. The mine is in sheet formation at 240 ft. depth and a 15-ft. face of ore has been demonstrated. A 250-ton mill will be built. W. N. Squires, of Joplin, is manager.

T. S. & J.—This company has secured the mill of the Brazos Mining Company on the Carter land, northwest of Webb City, and will move it to its mine near the Quick Seven, at Neck City.

Spring City—Arthur Scott has made a rich drill strike on the Zeta land at Spring City, east of the Delta. The drill went into the ore at 168 ft. and encountered about 10 ft. of lead and zinc.

Tri-State Mining Company—This company, capitalized at $600,000, has been organized to develop lead and zinc deposits near Hollister in Taney county.

Montana

A telegram from Butte Aug. 2 says: "Officials of the Butte Miners Union assert that 2000 men have been laid off from underground, and the reduction in output aggregates 3000 tons per day. The Parrot and Neversweat of Anaconda, and the Rarus of Butte Coalition are shut down, and it is expected that further curtailment will be immediately brought about."

Broadwater County

J. J. Goodman has recently shipped a 30-ton car from the Cynosure claim, eight miles from Winston, to East Helena. The claim is developed by a tunnel 180 ft. long and an 80-ft. raise from the tunnel level to the surface. In Iron Age gulch, Charles S. Muffley has been shipping from his property for some time, but owing to litigation the present shipment will be the last for a while. Charles Clark, who owns a claim adjoining the Muffley property, has enjoined the further working of the Muffley property, claiming that the orebodies in controversy belong to him.

Broadwater—The company is operating seven quartz claims about 4½ miles west of Townsend. The shaft is now down 60 ft. on the vein, which assays gold and copper.

Granite County

In the Princeton district, Arthur V. Corry is erecting a cyanide plant at the Sunday mine, which will soon be completed. A shipment has recently been made. Otto Lindquist has made a shipment from the Royal mine, working under lease. At the Northern Bell, C. W. Tyrer intends to install a steam hoist. In the Frog Pond basin, above the Moose Lake district, Frank Lutz has run a 250-ft. tunnel on his property and has cut a vein 4 ft. wide. The presence of surveyors in the neighborhood would indicate that the Northern Pacific railway is planning a branch into the Moose Lake district.

Jefferson County

Boston & Alta—On the 665-ft. level, 560 ft. from the shaft, the old Alta vein has been cut and after crosscutting 15 ft. the hanging-wall has not yet been reached. This is 100 ft. below the old workings. When the vein has been crosscut north and south drifting will be begun. Manager Hewett states that the vein contains gold, silver and copper ore.

Assets—This gold property is near Jefferson City at the base of the Elkhorn mountain and comprise 14 claims. Considerable excitement has been caused by the recent strike of ore, assaying $58,000 to the ton on the Yellow Jacket claim. The claims are being worked by a crosscut tunnel in 400 ft. which will be continued another 1000 ft.

Lincoln County

Victor-Empire—The stock has been made assessable. Work has been begun repairing the flume, 800 ft. of which was washed out this spring and 500 ft. has been rebuilt. When this has been completed the tunnel, now in 805 ft., will be driven another additional 500 ft., to cut the orebody discovered at the surface.

Powell County

Elliston—Operations on this copper property are being carried on steadily, although no shipments are being made. A lead of from 65 to 70 ft. wide has been cut. The directors are considering the construction of a railway to the property.

Nevada

Esmeralda County

Goldfield Consolidated—Mill Superintendent Hutchinson is making preliminary tests on an experimental blast furnace, modeled after the furnace which will probably be installed in the new refinery. The tentative plan is to briquet the cyanide precipitates, charge in the blast furnace with litharge and coke, and finally cupel the base bullion before shipment. Grading has been started on the new refinery site about 100 yd. from the mine proper, and as soon as the details of the plant are decided upon, the construction will be rushed to completion.

Nevada Eagle—Ore broken in exploration from the 250-ft. level is being extracted preparatory to shipment.

Florence—A. D. Parker, of Denver, formerly vice-president, has assumed the presidency of the company and will hereafter devote more of his time to Florence affairs. During his visit to Goldfield, Mr. Parker thoroughly examined the property and expresses himself as being satisfied with the situation. A thorough sampling of the tailings dump shows an average of $1.31 per ton, and with operating expenses totaling less than $8, a comparatively low grade of ore can be handled at a profit.

Lincoln County

Duplex—The option held by the Homestead company on the Searchlight property has lapsed and the owner, C. F. Colton, will undertake development.

Nye County

Tonopah-Belmont—The June report shows: 1236 tons shipped to smeltery; 6157 tons milled; total value, $276,434; net profit, $151,765. The main Belmont vein, which is producing the greater part of this rich ore, has now been proved for nearly 700 ft. on its strike, and 400 on the dip with an average width of 15 ft. To date practically no stoping has been started on the vein.

Tonopah—During June, 15,023 tons of ore were crushed and treated, with a reported extraction of 91.2 per cent. The ore averaged 0.347 oz. gold and 30.44 oz. silver, or $23.45 per ton.

MacNamara — Diamond-drill work from the 800-ft. level has commenced.

Pioneer—Water shortage has curtailed milling operations; only 60 tons are treated daily and an extraction of 96.5 per cent. reported.

Tramp Consolidated—The most important development in the Bullfrog district for many months is the work being done below the Bonanza Mountain fault by the Eclipse lease, on Tramp Consolidated ground. The continuity of the oreshoots at present being worked seems to be established about 125 ft. lower down.

Round Mountain—A new and apparently distinct orebody has been exposed at 300 ft. and at a distance of 240 ft. from the main vein.

White Pine County

Giroux—The work of sinking the new five-compartment shaft below the 1200-ft. level has been resumed. At the 1400-ft. level, when reached, another pumping station will be cut and a 600-gal. pump will be installed. As soon as the pumps are installed in the station now being completed at the 1200-ft. level, a crosscut will be started toward the Alpha workings, about 750 ft. distant.

Nevada Consolidated—Construction on the fifth reverberatory furnace at the McGill plant of the Steptoe company is being rushed and the furnace will probably be blown in during August. The furnace is the same size as the four already in use, 112 ft. by 19 ft., and will have a rated capacity of 250 tons of calcines per day.

New Mexico

Grant County

Savanna—It is reported that the Rio Tinto Copper Company, of Cleveland, has acquired control under 90-day option of the large holdings of this company in the Pinos Altos mountains, nine miles north of Silver City. The Rio Tinto company is also largely interested in Mexico, and is controlled by the Corrigan-McKinney interests.

Mangas—This development company, financed by Michigan capital, has temporarily suspended exploratory work. This action was influenced by the con-

dition of the stock market and as soon as market conditions improve, work will be resumed on a larger scale. The exploration is being done by churn drilling, the company having on the ground two No. 6 Cyclone and one No. 25 Star drilling machines. A number of holes showed considerable copper-bearing ground, but the most promising ground, as far as surface indications show, has not yet been drilled. The company owns in fee and controls under option about 2300 acres. H. A. Linke is superintendent.

American Exploration and Mining Company—The company is building a 50-ton mill and mine equipment at Steeple Rock. W. Franklin Burnham, of Boston, is manager.

SOCORRO COUUNTY

Deadwood—Contract has been let for lumber for the mill, grading for which has started. The initial installation is designed to treat 50 tons daily. Mine work and shaft sinking continue with a full crew.

Helen—The power plant will be ready for operation soon, and machine drills will be started.

Ohio

BELMONT COUNTY

Kennon Coal and Mining Company—The power plant of this company, at Flushing, in Belmont county, was burned down last week, making almost a total loss. The company has its office in Cleveland, and will rebuild at once.

Purseglove Coal Company—This company has purchased from A. Y. Malcomson, of Detroit, over 1000 acres of Pittsburg No. 8 coal at Stewartsville, on the Baltimore & Ohio Railroad, eight miles west of Bellaire. This consideration is $150,000. The company will start work on a steel tipple and power house. Over 400 men will be employed.

Oklahoma

Natural gas is being piped into Miami and the mines by another company than the Quapaw Gas Company. This company is piping gas through the camp but is not allowed by the peculiar Oklahoma laws to sell any in the State of Oklahoma.

Carson-Dodson—L. C. Church is moving the Edna Ray mill from the southern part of the Miami camp to the extreme north where he will erect it on this lease. The mine is opened to 230 ft. and the ore is high grade—not containing bitumen and iron as does the ore from the south end of the camp.

Pennsylvania

BITUMINOUS COAL

The Pennsylvania and the New York Central railroads have arranged to build jointly a branch from Clymer to Homer and thence across to the Conemaugh river; also a line from Cresson to Vintondale. These branches will open up the Dixon's run, Twolick and Blacklick coalfields, where some large tracts of coal have lately been bought by New York and Philadelphia operators.

Quemahoning Coal Company—This company lately bought 3000 acres of coal at Husband, near Somerset, and has begun work on its development. A shaft is being sunk near Husband. A large tipple will be built and will convey the coal from the pit mouth to a spur which the Baltimore & Ohio will construct to connect this mine with the new coal road now in construction.

Utah

To meet the demands put upon the Garfield plant of the American Smelting and Refining Company by the enormous output of the Utah Copper Company, the plant will be enlarged immediately. New reverberatory furnaces will be installed and a number of additions made to the equipment, including a new stack 350 ft. high. It will take about a year to complete the additions, and the Garfield plant will then produce about 275 tons of copper each day.

BEAVER COUNTY

South Utah—The new contract with the International company calls for the treatment of 200 tons of concentrates, or of ore, daily. Shipments may be started in August.

Indian Queen—This company has closed for the present, owing to disappointing results from development. The tunnel has been driven nearly 4500 ft., and is down 1200 ft. from the surface in the face. A mineralized fissure was encountered 1500 ft. from the portal, and drifted on 500 ft., without ore being obtained. The property is controlled by the Knights, and is near the King David, which is under the management of the same interests.

Red Warrior—The copper ore recently opened on the lowest level is being drifted on.

Michigan—Work on the lower levels has been retarded by bad air. Arrangements for better ventilation are being made.

Utah United—Copper ore, 18 in. wide, some of it carrying native copper, has been opened on the 200-foot level. The shaft is being sunk to the 400, where water level is expected. The property is 12 miles west of Milford in the Beaver Lake district.

Opex—Considerable interest exists as to conditions at the mine. There are reports of a face of ore having been developed, but this is neither confirmed nor denied. Stockholders have asked for a statement, which has not been granted. An assessment of 3c. a share was levied July 23.

Arrowhead—This property has been worked intermittently for some time, but only recently has any systematic development been undertaken. The last lessees shipped four cars from the surface. The country rock is limestone, which outcrops about 200 ft. wide, and is cut by veins of lead-carbonate ore, carrying some galena. A 6-ft. vein is being developed. The winze which is being sunk from the tunnel level has broken into ore at 70 ft., showing considerable galena. An ore bin is being built, and the wagon road extended.

Chief Consolidated—A telephone system has been installed in the underground workings.

Mammoth—The shaft damaged by the dropping of the cage is being repaired. The 500-ft. level has been passed in the work of retimbering, and when the 1000-ft. level is reached, mining and shipments will be resumed.

Sioux—From 14 to 16 cars per week are being mined. A part of this is from the 450-ft. level. The largest tonnage comes from the northern workings.

Tintic Combination—Work on the 220-ft. level will be continued, when the assessment pending is paid. The shaft is being kept free from water.

SALT LAKE COUNTY

Montana-Bingham Consolidated—The Bingham-Butte Mining Company has been reorganized under the name of the Montana-Bingham Consolidated Mining Company, with the principal object of making the stock assessable. Capitalization is $1,500,000. The exchange of shares of the old company for those of the new will be on the basis of share for share. A considerable part of the stock will remain in the treasury after the exchange has been effected.

Silver Shield—Foundations for the concentrating plant are nearly completed. The plant will have a capacity of 60 tons daily, but will begin on a smaller scale. Connections by means of a drift and raise have been made with the new ore from the 300-ft. level. Other connections for economical extraction will be made.

Big Cottonwood Consolidated—Work has been started on this property just below the Carbonate. A tunnel will be driven to cut several veins showing lead and silver on the surface.

Columbus Consolidated—Five feet of ore have been found on the contact of white and blue limestone above the 400-ft. level.

SUMMIT COUNTY

Daly-Judge—The managements of the Daly-Judge company and the Daly-West, Ontario and Daly companies have agreed to a deal by the terms of which the Ontario drain tunnel will be driven into the Daly-Judge territory.

Washington

FERRY COUNTY

New Republic—This company is considering the erection of a cyanide plant on their property near Republic.

OKANOGAN COUNTY

Tonasket—This group near Okanogan is developed to the producing stage, and is only waiting for the completion of the railroad into the camp to begin shipping. Six crosscut tunnels and four shafts have been put in.

SKAMANIA COUNTY

Washougal Gold and Copper—A strike of high-grade ore was recently made on this property near Cape Horn. A concentrator is being built and the mine expects to soon be shipping. A. O. Wright, of Vancouver, Wash., is interested.

STEVENS COUNTY

Napoleon—The buildings at this mine have been destroyed in a recent forest fire.

Blue Jim—A compressor is being installed at this mine, also electric power. The crosscut started early in the season is in 215 ft. The property is 5 miles from Metaline.

West Virginia

KANAWHA COUNTY

Webb Coal and Mining Company—This company has been organized by Cincinnati people with the following officers: Lewis M. Webb, president and treasurer; E. H. Shonk, Miami, W. Va., vice-president; B. R. Appleton, secretary; John Holmes, Garrison, W. Va., general manager. The company will develop coal near Charleston, in Kanawha county. Work has already been started on two drift entries and the company will be shipping by Dec. 1. The mines are on the Chesapeake & Ohio.

Canada

BRITISH COLUMBIA

Forest fires have destroyed mining property in Slocan district to an extent roughly estimated at $250,000. Rambler-Cariboo lost considerably in buildings and plant, but saved air-compressor and heavy machinery generally; also its concentrating mill. Lucky Jim lost buildings and tramways; fire here caused death of Col. Pearson, tramway-construction superintendent; W. A. Chesley, the Riblet company's tramway supervisor; Charles Norman, foreman of mine; and E. Lucas and D. Peterson, miners. Foreman Norman lost his life in an effort to save Lucas. Whitewater and Whitewater Deep lost large buildings, concentrating mill, etc. As all mines are worked chiefly from deep-level adits, underground damage is small, and resumption of work will be practicable without much delay, except in milling at the Whitewater.

Western Canada Oil—This company is prospecting for oil and coal within 20 miles of Victoria, Vancouver island. Drilling is in progress and a 200-ft. depth has been reached.

Granby—On July 15 diamond drilling was commenced on the 400-ft. level, the intention being to test the ground down to 1000 ft. depth. Jay P. Graves, vice-president, lately announced that diamond drilling in progress in the lower levels is disclosing satisfactory orebodies.

Consolidated Mining and Smelting—Trail smeltery statistics for the year ended June 30: Ore received, 485,457 tons; ore smelted, copper furnaces 430,851 tons, lead furnaces 60,274 tons, total 487,125 tons; matte shipped, 7072 tons; lead bullion to refinery, 22,117 tons. Production: Gold, 137,614 oz., $2,814,676; silver, 2,162,406 oz., $1,134,881; copper, 5,974,959 lb., $779,230; lead, 42,365,816 lb., $1,182,980; total value of production, $5,911,767. Refinery production: Lead, 21,184 tons, $1,182,980; gold, 14,017 oz., $289,241; silver, 1,991,357 oz., $1,045,957; total, (included in foregoing total production) $2,518,178.

Copper Creek—This company is considering the erection of a smelting plant for its property in the Portland Canal district. M. K. Rodgers, of Seattle is manager.

Eureka—This property in the Sheep Creek district has been taken over by Hymann & Van Houten, of Vancouver, who are considering the installation of a stamp mill.

Columbia Coal and Coke Company—This property near Princeton is to be equipped with modern machinery, and will within a year be producing bituminous coal. George Fraser, of Princeton, has charge.

ONTARIO

Shipments of ore from Cobalt camp for the week ended July 22 were: Buffalo, 59,010 lb.; Chambers-Ferland, 59,400; Coniagas, 60,400; Crown Reserve, 203,900; Kerr Lake, 300,142; La Rose, 227,400; McKinley-Darragh, 95,240; Nipissing, 484,600; Peterson Lake, 101,710; Right-of-Way, 75,900; Trethewey, 49,260; total, 1,716,962 pounds.

Doctor Reddick-Larder Lake Mining Company—This company has made an assignment at Ottawa to David S. Sawyer.

Buffalo—The mill report for June shows 2918 tons assaying 23.62 oz. treated. The mill ran 465 hours at a cost of $5452.

Crown Reserve—Another new vein has been cut on the 200-ft. level 900 ft. up the lake. It shows about 6 in. of high-grade ore.

Cross Lake—Silver has been found in a test-pit near the lake.

Chambers-Ferland—The Offshoot vein has been cut on the third level and is rich.

Nipissing—Fifteen inches of ore has been opened up on the 300-ft. level of No. 64 vein.

Bellellen—A high-grade oreshoot has been opened up on the 68-ft. level at this South Lorrain property.

YUKON TERRITORY

The first arrivals direct from the Haiditarod this season bring word that the camp is overdone with men, and that conditions are uncertain, and that now water extends over a great portion of the district. Some of the miners are preparing to pump the water from their claims in doing opencut work later in the season.

Atlas—This company is opening up its copper property near Whitehorse. The mine is being equipped with machinery and they expect to begin shipping copper ore in the near future.

Pueblo—This copper mine has been sold to Greenough Brothers, of Spokane, who will begin the shipment of about 200 tons per day about Aug. 1. A railroad track has been finished from Whitehorse to the mines.

Mexico

CHIHUAHUA

Col. J. W. Pender is interested in the exploitation of a newly discovered gold property about 30 miles southwest of Socorro, near the Mayo river.

Batopilas—This company has reported the discovery of several gold-bearing veins, varying from mere stringers up to lodes over 6 ft. in width.

MEXICO

Esperanza—The report for June is: The mill ran 28 days and crushed 17,243 dry tons; estimated realizable value of bullion and concentrates, $202,657; working expenses, etc., $107,081; net, $96,423.

SINALOA

Sarabia—Dr. J. W. Yard and Martin Fishback, of El Paso, have acquired this mine near the Southern Pacific road near the village of Sinaloa and will develop it.

SONORA

Greene-Cananea—The referee of the New York Supreme Court has rendered a decision in the favor of the company in the title suits, long pending. The report is made in the suit of Axel W. Hallenborg, on behalf of himself and other stockholders of the Cobre Grande Copper Company, of Arizona. The report decides that not only is the Greene Consolidated Copper Company entitled to judgment on the merits of the action, but also that all matters of law and fact in the case had already been adjudicated and determined in the company's favor in other actions between subtantially the same parties brought and tried in Arizona and Texas, and one of which was appealed to the Supreme Court of the United States.

THE MARKETS

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

Coal Trade Review

New York, Aug. 3—Coal trade in the East is uneventful and somewhat affected by the usual summer dullness.

In the West such mines as are at work are very active and are doing well. Demand for steam coal is good. There have been no important changes at the suspended mines, as is shown in the notes below.

Western Strike Conditions—The compromise arranged at Indianapolis last week, which, it was hoped, would end the strike in Illinois, has been voted down almost unanimously by the miners. The operators have held a meeting and resolved to make no further concessions, so that the end of the strike seems still far off.

The latest conference of the Southwestern miners and operators at Kansas City has ended without an agreement. It is said that a strike order will be issued this week, covering Missouri, Kansas, Arkansas and Oklahoma.

A committee from the United Mine Workers is trying to arrange some compromise in the Irwin district of Pennsylvania, where the local strike still continues, and a bitter feeling has been shown.

Coal Traffic Notes

Connellsville coke production for the 26 weeks ended July 2, as reported by the *Courier*, was 11,290,099 short tons; shipments were 338,382 cars. The weekly averages were 434,235 tons made and 13,015 cars shipped.

New York

Anthracite

Aug. 3—The anthracite trade has been quiet, so far as domestic sizes are concerned. For the steam sizes there seems to be a more active demand than is usual at this season.

On Aug. 1 another 10c. was taken off the summer discounts. Schedule prices for domestic sizes are now $4.65 for broken and $4.90 for egg, stove and chestnut, f.o.b. New York harbor points. For steam sizes, current quotations are: Pea, $2.95@3.25; buckwheat, $2.15@2.50; No. 2 buckwheat, or rice, $1.65@2; barley, $1.35@1.50; all according to quality, f.o.b. New York harbor.

Bituminous

Business remains about as last week, with a fair demand and some improvement in sales, especially in New England territory; but New York harbor trade is still dull.

Prices are unchanged. Gas coal sells at 95c.@$1 at mine for ¾-in., 85c. for run-of-mine, and 60c. for slack. Good Miller vein steam coal brings about $1.25 at mine and prices run up to $1.45 for George's Creek. Lower-grade steam coal can be had at 95c.@$1 at mine.

Car supply is good and transportation still a little slow. A good deal of coal continues to go West.

In the coastwise trade rates are about the same. From Philadelphia large boats get 80@90c. to Boston, Salem and Portland. For New York small boats can be had at 50@60c. to points around Cape Cod.

Birmingham

Aug. 1—Several of the Southern railroad officials have placed orders for coal lasting eight or nine months, while orders from other sources have been coming in until it is reported that never before at this time of the year was there more business in hand than now.

A railroad branch is being surveyed into the Cahaba coalfield and early next year there will be development on a large scale in that field.

The demand for coke in this section is strong and all coke ovens in shape are being operated on full time.

Chicago

Aug. 1.—Buying of coal is rather light, in view of the prospect of new supplies from the Illinois mines, though these can hardly be received for two or three weeks, even with prompt reopening of the mines, as a result of settlement of labor troubles—a change not yet certain. The average buyer is of the opinion that prices should be lower on his purchases, and the average seller holds out for the prices that have been prevailing, on Indiana coal, the chief supply of this market. Current needs, however, are large, and few users of steam coals have storage piles, so they must buy constantly. Under these conditions lump from the Indiana mines hold to $2@2.15, run-of-mine to $1.90@2 and screenings, still the size most in demand, to $1.90@2.10 per ton.

Eastern coals continue in large demand for current needs, and it is probable that with the resumption of supplies from Illinois the demand for these coals will be permanently larger than before from users who have learned their value. Smokeless holds firm at $3.55 for lump and egg and $3.15 for run-of-mine. Hocking is in very good demand and firm at $3.15. Youghiogheny brings $3.22 for ¾-in. lump and Pittsburg No. 8 holds to $2.85 for the same size. There is no surplus anywhere on tracks, in this vicinity, shipments having been well regulated to the buying power of the market, and consequently demurrage sales do not exist. Anthracite sales are light.

Cleveland

Aug. 1—Coal is coming in freely, but most of it is for shipment up the Lakes. That trade is active, and the total will show up well from present indications. Local trade is not active, but prices are firm, as supplies are not large.

Middle district coal, f.o.b. Cleveland, is $2.15 for 1¼-in.; $1.90 for ¾-in.; $1.80 for run-of-mine and $1.55@1.65 for slack. No. 8 and Cambridge district 5 or 10c. higher. Other sorts unchanged.

Indianapolis

Aug. 2—This city continues to be the center of negotiations for settlements between miners and operators. The Illinois settlement reported last week failed through the veto of the miners. Other negotiations also seem to be in a bad way.

Indiana mines continue active, and orders are still coming in. A large quantity of Indiana coal is going to the Chicago market, where it has taken the place of Illinois coal for the time being.

Pittsburg

Aug. 2—No change has occurred in conditions, local demand being fairly good, while Lake shipments hold up well and the year's tonnage promises to pass the record or come very close to it. In the Greensburg and Latrobe mines more men are at work and the strike seems to be nearly played out. Prices continue quotable as follows: Mine-run and nut, $1.20@1.25; ¾-in., $1.30@1.35; domestic 1¼-in. lump, $1.50; slack, 70@80c. per ton.

Connellsville Coke—The market is moving along smoothly without special incident. Production has been adjusted closely to the demand, and since the early part of July, when some stocks were cleaned up, there has been no accumulation. Prices previously quoted are well maintained, although sales of prompt furnace coke are light and no contracts at all are being made for furnace. The foundry-coke trade is also quieter as to new buying. We continue

to quote standard grades of Connellsville coke as follows: Prompt furnace, $1.65@1.70; contract furnace (nominal), $1.75@1.85; prompt 72-hour foundry, $2.10@2.25; contract foundry, $2.25@2.50 at ovens.

The *Courier* reports the production in the Connellsville and lower Connellsville region in the week ended July 23, at 406,507 tons, an increase of 2000 tons, and shipments at 4058 cars to Pittsburg, 5537 cars to points west and 869 cars to points east, a total of 10,464 cars.

St Louis

Aug. 1—Conditions this week have been a great surprise for the coal man. Last week everyone looked for a settlement in the Carterville and Springfield districts. When it was announced that the joint committee of the miners and operators in Indianapolis had agreed on a scale which was to be up to the miners for referendum vote, it was generally thought that the scale was as good as signed. In making the scale the operators agreed to stand an extra 2c. advance and to pay the shotfirers, though when the cost of shotfiring exceeded 1½c. per ton the balance of the cost was to be sustained by the miners. On this, the market broke. However, when the vote of the miners began to come in, it was seen that the miners were springing a surprise by voting down the proposition. They figure that as long as they have been able to stay out for four months, that it would not hurt them to remain out a little longer. This, of course, turned the market another way and coal immediately sprang into great demand with advancing prices.

Current prices are as follows for the St. Louis market:

	Mine.	St. Louis.
Illinois, Standard:		
6-in. lump and egg	$1.50	$2.02
2-in. lump and nut	1.10	1.62
Mine-run	1.00	1.52
Screenings	1.00	1.52
Trenton:		
6-in. lump and egg	1.90	2.42
3-in. nut	1.75	2.27
1-in. nut	1.20	1.72
Staunton or Mt. Olive:		
6-in. lump	1.70	2.22
2-in. nut	1.60	2.12
Mine-run	1.50	2.02
Screenings	1.50	2.02
Carterville:		
6-in. lump or egg	1.50	2.17
3-in. nut	1.50	2.17
Mine-run	1.50	1.97
Screenings	1.25	1.92
Pocahontas and New River:		
Lump or egg	1.50	4.00
Mine-run	1.10	3.65
Pennsylvania Anthracite:		
Nut, stove or egg	.....	6.75
Grate	.....	6.50
Arkansas Anthracite:		
Egg or grate	3.35	5.35
Coke:		
Connellsville foundry	.....	5.40
Gas house	.....	4.50
Smithing	.....	4.15

A number of jobbers who had been speculating were caught and had to buy freely in order to cover. Railways and large industries which had been holding off awaiting a settlement have been forced to come onto the market again; consequently coal is very scarce and is advancing. Dealers are also beginning to buy, and while none of the high-grade mines are running, they are forced to buy the best that they can get to supply their early trade.

The anthracite situation for July was not quite up to expectations. The soft-coal situation has distracted the attention of dealers, and the demand for hard coal was light. Of course, this tonnage will have to be made up later and will result in a rush in either August or September.

FOREIGN·COAL·TRADE

United States Coal Exports—Exports of coal and coke from the United States, with coal furnished to steamships in foreign trade, six months ended June 30, long tons:

	1909.	1910.	Changes.
Anthracite	1,470,464	1,581,583	I. 111,119
Bituminous	3,803,216	4,523,235	I. 720,019
Total exports	5,273,680	6,104,818	I. 831,138
Steamer coal	3,018,261	3,191,494	I. 173,233
Total coal	8,291,941	9,296,312	I. 1,004,371
Coke	468,368	444,920	D. 23,448

Canada took this year 4,426,811 tons of coal, or 72.6 per cent. of the total exports. Cuba took 424,281 tons of coal. The coke went chiefly to Mexico and Canada.

United States Coal Imports—Imports of coal and coke into the United States, six months ended June 30, long tons:

	1909.	1910.	Changes.
Anthracite	3,125	162	D. 2,963
Bituminous	675,488	924,063	I. 248,575
Total coal	678,613	924,225	I. 245,612
Coke	99,844	57,377	D. 42,467

Canada furnished this year 790,895 tons of coal and nearly all the coke; Australia, 76,852 tons of coal; Japan, 50,741 tons of coal. Imports are chiefly on the Pacific Coast and in the far northwestern States.

Austro-Hungarian Production—Coal production of Austria-Hungary, four months ended April 30, metric tons:

	1909.	1910.	Changes
Coal	4,653,297	4,611,365	D. 41,932
Brown coal	8,498,465	8,372,556	D. 125,909
Total mined	13,151,762	12,983,921	D. 167,841
Coke made	697,049	645,891	D. 51,158
Briquets made	123,005	113,621	D. 9,384

Of the briquets reported this year 59,891 tons were made from brown coal or lignite.

Welsh Coal Prices—Messrs. Hull, Blyth & Co., London and Cardiff, report current prices of Welsh coal as follows, on July 23: Best Welsh steam, $3.99; seconds, $3.78; thirds, $3.60; dry coals, $3.60; best Monmouthshire, $3.54; seconds, $3.42; best steam smalls, $1.98; seconds, $1.68. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON·TRADE·REVIEW

New York, Aug. 3—Notwithstanding the midsummer season, the iron and steel markets are in a little better condition, with signs of life and hope for the future—at any rate so far as consumption is concerned.

In pig iron there has been more buying of foundry iron, though the purchases do not run far ahead. Basic iron also is in a little better demand. There are plenty of inquiries for fourth quarter, but views as to prices vary too much for actual business.

In finished material small orders continue to be the rule, but the total volume of sales exceeds previous anticipations. The present season was approached by the large manufacturers with a good deal of apprehension, but they have generally found that feeling unwarranted to a great degree.

Prices, however, have a downward tendency. No improvement in this respect is to be looked for as long as productive capacity exceeds consumption by 15 or 20 per cent. The lower prices are doing no harm, however; buying is certainly encouraged, and quotations have not yet reached a point where they spell loss to makers.

Baltimore

Aug. 2—Imports for the week included 4020 tons iron pyrites and 6110 tons cupreous pyrites from Huelva, Spain; 23,000 tons iron ore from Cuba.

Birmingham

Aug. 1—Southern manufacturers of pig iron are holding firmly at $11.50 per ton for No. 2 foundry. The business has not been active, the month of July being one of the dullest experienced in several years. The curtailment was not any too great for the trade that was handled. An inquiry or two is reported to have been received for iron to be delivered during the first half of 1911, but furnace-company officials in this section show no inclination to sell at the present prices. Car lots of iron are selling here at $12 per ton, but anything above 100 tons can be secured at a lower rate. One or two of the smaller iron companies in the Birmingham district have sold up all their iron for the balance of the year. Some of the larger companies with furnaces manufacturing special brands of iron are also well sold up.

Charcoal iron is still selling at $22 per ton, but the demand is not as active as it has been.

Chicago

Aug. 1—Sales of pig iron continue light. As a consequence, Southern No. 2 is obtainable at 25 or 50c. less than $11.50 Birmingham—$15.85 Chicago—that has been the standard price for

several weeks. Some iron has been sold at $11 Birmingham; more would be sold if even this price appealed to melters of large lots. But it does not, and though some iron is sold at $11.25 and even $11.50 Birmingham, the market drags. Northern No. 2 iron at $16.50 is steadier and selling agents are not so anxious, apparently, to dispose of it.

Lots sold are small, ranging from a carload up to 700 or 800 tons. Few melters will contract for general last-quarter needs, or go into the first quarter of the next year. They prefer to buy for their current needs—30 to 90 days ahead—and trust to developments of the market. That melters are watching the market closely appears, however, from the fact that inquiries for large tonnage deliveries to be for last and first quarter, are large constantly, though resulting in few contracts.

Iron and steel products, despite some cuts in prices, do not find heavy sale, the only approach to activity being in structural steel.

Cleveland

Aug. 1—Ore shipments are apparently falling off; at least there is some waiting for cargoes. It is reported that a few resales of ore have been made by furnaces.

Pig Iron—There are only a few inquiries reported, most of them small. Quotations for prompt and third-quarter iron, Cleveland delivery, are $16.25@16.50 for bessemer; $14@14.25 for basic; $14.25@14.75 for No. 2 foundry; $14 for forge.

Finished Material—Structural steel sells, but in a small way; and there is some call for bars. Cutting on bars has apparently been stopped for the present, and 1.40c., Pittsburg base, is about the limit.

Philadelphia

Aug. 3—With a decline in production of 15 per cent. during the past few months, a weakening in prices and no material increase in stocks when contracted for deliveries are taken into account, the pig-iron situation is relatively better than 30 days ago. This deduction is based on the fact that large users of pig iron are low in stocks or have no contracts running for future delivery to the extent they had a year ago. Some tempting offers of Southern iron have been declined. Northern makers are not pushing iron on the market just now. No. 2 X foundry is quoted today at $16.25; basic, $15.50; forge, $15.50 per ton.

Steel Billets—Final deliveries were made this week on supplies ordered two months ago.

Bars—New business is scant, but prices are firm.

Sheets—It is said that further shadings have been offered if large orders are placed this month.

Pipes and Tubes—A healthy business is done in cast pipe. Tubes are strong at recent discounts.

Plates—New business has been exceptionally light in this territory.

Structural Material—Orders have been good all summer, but are now slacking up. Most business is for small lots. The mills are in a strong position and present quotations are bottom, a conclusion accepted by buyers.

Scrap—Dealers report very little business.

Pittsburg

Aug. 2—There are slight signs of an improvement in demand for finished steel, specifications in some lines having improved as compared with the early part of July, while July as a whole showed no material decrease from June, although a month from which normally very little is expected. In the past week there has been no material change in finished-steel prices, except in steel bars, which have been sold by several large interests, on attractive business, at 1.40c., Pittsburg, $1 a ton under the regular market. This, it is stated, is done by the mills to protect their trade, although the responsibility for the first cut is not clearly fixed. There are still some sales made at 1.45c. Even at 1.40c. bars are at least as high as plates and shapes, which is unusual, as in the past they have almost invariably sold at about $2 a ton below plates and shapes.

Pig Iron—It develops that on the transaction noted in last report for 10,000 tons of basic iron at $14, Valley furnace, the purchaser was a middle interest in Pittsburg, the seller being a Valley furnace, and the terms that the iron shall all be paid for within the next month or two. The purchaser expected to make a profit by carrying the iron and retailing at higher prices, so that the market is not quotable at $14, but it is not altogether impossible that the price would be done again on a large lot for quick settlement. The United Steel Company, Canton, O., inquires for 10,000 to 12,000 tons of basic for fourth quarter, and the business will probably be taken by Canal Dover or Cleveland interests. There is an inquiry for 400 tons of standard bessemer from the West, with occasional little inquiries for malleable. Odd lots of foundry iron, generally carloads to 100 tons, are selling at $14.50, Valley. Otherwise the market is absolutely without feature. Alice furnace, at Sharpsville, Penn., has gone out, leaving 10 of the 21 merchant furnaces in the Valleys in blast. We repeat former quotations, at Valley furnaces, 90c. higher delivered Pittsburg: No. 2 foundry, $14.50; malleable, $15; basic, $14.25@14.50; gray forge, $13.75. The bessemer average for July is reported at $15.50, Valley, against $15.62 for June and $19, the high point, in November, December and January. The basic average for July is reported at $14.50, Valley, against $14.70 in June and $17.48 last November, the high point.

Ferromanganese—The market for prompt ferromanganese is possibly a shade firmer, as sales have been made at $39.25 and $39.40, but transactions are very light and there is little if anything being done on forward deliveries. We quote, f.o.b. Baltimore, $39.25@39.50 for prompt and $39.50@40 for forward delivery.

Steel—A consumer of sheet and tin-bars in the general Pittsburg district has made a large contract with a leading steel interest for about five years, and extended a couple of other contracts, and is thus provided with a minimum monthly tonnage of 7000 tons and a maximum of 10,000 tons. The settlement is on a scale basis, relative to the average price of pig iron. The market is rather soft, with few transactions, and remains quotable nominally as follows, f.o.b. Pittsburg or Youngstown: Bessemer billets, $25; sheet bars, $26@26.50; open-hearth billets, $26; sheet bars, $27@27.50; forging billets, $30; rods, $29@30, Pittsburg.

Sheets—There has been no change. There is a general shading of $3 a ton on black and $4 a ton on galvanized, and the leading interest is meeting this market in some cases, but not in all. An official reduction in prices is expected. Official or nominal prices remain: Black sheets, 2.40c.; galvanized, 3.50c.; painted corrugated roofing, $1.70; galvanized, $3; blue annealed sheets, 1.75c. These prices are subject to the shading noted, except blue annealed, which are well held.

St. Louis

Aug. 1—The pig-iron market remains stagnant. Inquiries are light and sales are lighter. The price of $18 per ton, Birmingham, or $15.75, St. Louis, remains the current figure.

FOREIGN IRON TRADE

German Foreign Trade—Exports and imports of iron and steel, and of machinery, in German Empire, five months ended May 31, metric tons:

	Exports.	Imports.	Excess.
Iron and steel..	1,949,532	218,386	Exp. 1,731,146
Machinery.....	137,569	31,503	Exp. 106,066
Total.....	2,087,101	249,889	Exp. 1,837,212
Total, 1909.....	1,666,090	199,892	Exp. 1,466,198

Imports of iron ore this year, 3,145,480; exports, 1,109,650 tons. Imports of manganese ore, 191,493; exports, 1645 tons.

United States Foreign Trade—Exports and imports of iron and steel in the United States for the six months ended June 30 are valued as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1909.	1910.	Changes.
Exports.....	$74,852,693	$92,942,859	I.$18,090,166
Imports.....	12,694,285	20,625,203	I. 7,930,918
Excess, exp.	$62,158,408	$72,317,656	I.$10,159,248

The leading items of imports and exports were as follows, in long tons:

	Exports		Imports	
	1909.	1910.	1909.	1910.
Pig iron.....	23,927	42,009	58,903	120,024
Scrap.....	17,811	11,839	2,250	57,356
Billets, blooms, etc.	60,839	7,531	6,382	24,332
Bars.....	38,899	57,445	7,146	21,813
Rails.....	120,594	189,832	380	5,868
Sheets and plates..	77,991	135,610	1,638	3,771
Structural steel....	45,616	75,014	2,690	7,203
Wire-rods.....	9,402	16,266	5,687	10,844
Wire.....	76,063	82,670	.....	.....
Nails and spikes..	23,058	28,553	.....	.....
Tinplates.....	4,331	6,704	29,810	36,214
Pipe and fittings..	72,517	74,108	.....	.....

Imports of wire not reported in quantities; values were $493,069 in 1909, and $758,040 this year.

United States Iron Ore Movement—Imports and exports of iron ore in the United States, six months ended June 30, long tons:

	1909.	1910.	Changes.
Imports.....	572,547	1,259,266	I. 686,719
Exports.....	154,331	242,713	I. 88,382

Of the imports this year, 757,480 tons were from Cuba, 472,461 tons from Europe and 128,062 tons from Newfoundland.

Imports of manganese ore for the six months were 92,181 tons in 1909, and 116,402 tons in 1910; increase, 24,281 tons.

METAL MARKETS

New York, Aug. 3—The metal markets have shown rather an improving tendency. Changes in prices have been only fractional, but generally in an upward direction.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1910..	$1,598,347	$ 4,575,917	Imp.$ 2,977,570
" 1909..	8,346,446	2,367,735	Exp. 5,978,711
Year 1910..	49,516,731	19,388,531	" 30,128,200
" 1909..	63,834,337	20,135,592	" 43,698,745
Silver:			
June 1910..	4,587,383	3,308,171	Exp. 1,279,212
" 1909..	5,505,037	4,339,275	" 1,165,762
Year 1910..	27,054,218	21,901,520	" 5,152,698
" 1909..	29,359,666	22,872,028	" 6,487,638

Exports from the port of New York, week ended July 30: Gold, $149,400, chiefly to Panama; silver, $790,882, chiefly to London. Imports: Gold, $2,858,986, almost all from London; silver, $7656, from the West Indies.

The preliminary statement of Transvaal gold production in July is cabled at 640,000 oz., which makes a total of 4,302,505 oz., or $88,932,778 for the seven months ending with July.

The substantial part of the recent Chinese decree establishing an Imperial currency is as follows: The unit of national currency shall be the *yuan*, or dollar, and the standard shall temporarily be silver. The dollar shall be the principal currency, and shall weigh 7 *mace* and 2 *candareens* (about 37.3 grams). The subsidiary coinage shall be three silver coins of 50, 25 and 10 cents each; one nickel coin of 5 cents, and four copper coins of 2 cents, 1 cent, 5 cash, and 1 cash respectively.

Gold—There was a good demand for gold on the open market in London, both from Berlin and New York, but prices continued as usual, 77s. 9d. per oz. for bars and 76s. 5½d. per oz. for American coin. About $4,000,000 in all was taken for shipment to New York.

Platinum—Business is on a moderate scale, but prices are unchanged. Dealers quote $33 per oz. for refined platinum and $37.50@38 per oz. for hard metal.

Silver—The market having fallen to 24½d., in London, owing to cessation of buying on bear account, it looks as if there might be a further decline on account of the lack of vigorous buying from any quarter.

SILVER AND STERLING EXCHANGE

July-Aug.	28	29	30	1	2	3
New York....	53⅛	53⅛	53⅛	53⅛	53⅛	53
London ..	24⅝	24⅝	24⅝	....	24⅝	24⅝
Sterling Ex..	4.8540	4.8530	4.8520	4.8530	4.8535	4.8530

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East from Jan. 1 to July 21, reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£3,723,800	£3,572,000	D. £ 151,800
China.....	1,174,700	1,113,500	D. 61,200
Straits.....	82,800	.....	D. 82,800
Total.....	£4,981,300	£4,685,500	D. £ 295,800

India Council bills in London sold at an average of 15.97d. per rupee for the week.

Copper, Tin, Lead and Zinc

July-Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
28	12⅛ @12½	12¼ @12⅜	55	32¾	4.40 @4.42½	4.30 @4.35	5.00 @5.02½
29	12⅛ @12⅜	12¼ @12⅜	55⅛	32⅞	4.40	4.30 @4.35	5.00 @5.02½
30	12⅛ @12⅜	12¼ @12½	....	32⅞	4.40	4.30 @4.35	5.00 @5.02½
1	12⅛ @12⅜	12⅜ @12½	....	33	4.40	4.30 @4.32½	5.00 @5.02½
2	12⅛ @12⅜	12⅜ @12½	54½	33¼	4.40	4.30 @4.32½	5.00 @5.02½
3	12⅛ @12⅜	12⅜ @12½	55⅛	33	4.40	4.30 @4.32½	5.00 @5.02½

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The situation in the market, broadly speaking, is reviewed elsewhere in this issue. During the week of July 27-Aug. 3, the advance continued in a quiet and orderly fashion. During the early part of the week some good orders appeared in the market. Some of the agencies which have sold pretty well ahead adopted a policy of observation, leaving the business to others that have disposed less extensively of their supplies. On July 30, the largest interest, which had previously been maintaining an asking price of 12⅝c. for Lake and 12½c. for electrolytic, delivered, 30 days, advanced its terms ⅛c. on each class of copper, and further transactions have since then been effected. Reviewing the week, a large business has taken place both for domestic consumption and export, and producers are now well booked ahead. Some of them are sold out for this and next month's delivery. The demand continues good, particularly for export, and the market closes firm, with Lake copper at 12½ to 12¾c.; electrolytic in cakes, wire-bars or ingots at 12⅜ to 12½c.; casting copper is quoted nominally at 12⅛ to 12⅜c. for the week.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14c. base, carload lots at mill.

The London market for standard copper has been very active, and last Friday spot was up to £55 10s. It was slightly lower on Monday, but closes at £55 12s. 6d. for spot and £56 2s. 6d. for three months. Speculative sentiment is decidedly better and more confidence is shown. Refined and manufactured sorts are quoted: English tough, £57 10s.; best selected, £59@59 10s.; strong sheets, £67@68 per ton.

Statistics for the second half of July show a decrease in the foreign visible supply of 4800 tons.

Exports of copper from New York for the week were 1316 long tons. Our special correspondent gives the exports from Baltimore for the week at 1822 tons.

Exports of copper from Atlantic ports in the United States in July are estimated at 22,875 long tons.

Copper in July—The month opened with electrolytic on the basis of 12¼c., but after the first week a weakish tendency developed, following the action of the largest seller, which for the first time in many months met the market, but was promptly undercut. During the middle

part of the month electrolytic was on a basis of 12⅛c. On July 21 the intimations as to probable curtailment of production induced some buying and rather large transactions were consummated at a slight advance. The market improved decidedly in tone upon the definite announcement of curtailment and the month closed with electrolytic at 12⅜c., firmly held.

Tin—In anticipation of favorable American statistics, the London market advanced gradually during last week. Monday, Aug. 1, being a holiday in London, the very favorable statistics of American deliveries only became available there on Tuesday, and promptly had the effect of advancing the market about £2 5s. for spot and £1 10s. for futures over the close of Friday. Domestic interests, who had been buyers all along, did not follow this advance, but rather turned sellers at somewhat below importation basis.

Spot material in this market is still scarce and firmly held. London closes at £151 for spot and £151 7s. 6d. for three months, while August deliveries are selling in this market at about 33 cents.

Visible stocks of tin on Aug. 1—including tin afloat—were: London, 9911; Holland, 3231; United States, excluding Pacific ports, 4291; total, 17,433 long tons; an increase of 1733 tons over the

Lead—The market is quiet, without special feature. Prices are a shade lower at 4.30@4.35c., St. Louis, and 4.40c., New York.

The London market is somewhat firmer, Spanish lead being quoted £12 10s. and English lead £12 12s. 6d.

Spelter—The market is quiet. Stocks of the metal, both in the hands of producers and consumers, are believed to be small, and consumption is good. However, until consumers change their hand-to-mouth policy, not much improvement can be looked for. The market closes firm at 5@5.02½c., St. Louis, and 5.15@5.17½c., New York.

New York quotations for spelter, July 30-Aug. 3, inclusive, were 5.15@5.17½ cents.

The London market is slightly firmer at £22 15s. for good ordinaries and £23 for specials.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

Other Metals

Aluminum—The market is quiet. There has been a slackening in demand recently, which is chiefly due to the check in the automobile trade, which is a large consumer of the metal. We quote 22¾c. per lb. for No. 1 ingots, New York delivery. The foreign market is also slower than it has been.

Antimony—A very quiet market is reported, with nominally no change in prices. Cookson's is quoted at 8.15@8.20c. per lb. Other prices are 7⅞@8c. for U. S.; 7¼@7½c. for outside brands.

Quicksilver—With an improvement in business and demand, prices are unchanged. New York quotations are $47 per flask of 75 lb. for large orders; $48@49 for jobbing lots. San Francisco, $46@46.50 for domestic orders and $2 less for export. The London price is £8 15s. per flask, with £8 12s. 6d. quoted by jobbers.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots, up to 55c. for 200-lb. lots. The price for electrolytic is 5c. higher.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

Cadmium—Current quotations are 60@70c. per lb. in 100-lb. lots, f.o.b. New York; according to quality of metal.

Bismuth—The price of bismuth has recently been advanced and the metal is now quoted by Johnson & Matthey, who handle it in England, at 7s. 6d.—$1.80—per lb. in London.

Imports and Exports of Metals

Exports and imports of metals in the United States, six months ended June 30, are reported as follows, in the measures usual in the trade:

Metals:	Exports.	Imports.	Excess.
Copper, long tons	132,446	75,589	Exp. 56,857
Copper, 1909....	152,781	71,522	Exp. 81,259
Tin, long tons....	257	24,641	Imp. 24,384
Tin, 1909.....	239	22,044	Imp. 21,805
Lead, short tons.	49,943	50,158	Imp. 215
Lead, 1909.....	50,793	58,832	Imp. 8,039
Spelter, sh. tons.	534	2,110	Imp. 1,576
Spelter, 1909....	2,188	1,687	Exp. 501
Nickel, lb.....	7,456,592	16,657,566	Imp. 9,200,974
Nickel, 1909....	5,850,422	7,792,374	Imp. 1,941,952
Antimony, lb.....	2,175	5,109,433	Imp. 5,107,258
Antimony, 1909.	4,032	6,539,430	Imp. 6,555,398
Platinum, oz.....	.....	55,556	Imp. 55,556
Platinum, 1909.	.....	55,527	Imp. 55,527
Quicksilver, lb..	120,402	.....	Exp. 120,402
Quicksilver, '09	163,018	.....	Exp. 163,018
Aluminum, value	$284,063	.....	Exp. $284,063
Aluminum, 1909	271,398	.....	Exp. 271,398
Ores, etc.:			
Zinc oxide, lb.	13,034,753	.....	Exp.13,034,753
Zinc oxide, '09..	15,606,692	.....	Exp.15,606,692
Zinc dross, lb....	5,756,134	.....	Exp. 5,756,134
Zinc dross, '09..	10,699,770	.....	Exp.10,699,770
Zinc ores, lg.tons	10,982	33,004	Imp. 22,022
Zinc ores, 1909.	7,081	54,074	Imp. 46,993
Antim'y ores, lb.	.....	.....	.....
Ant. ores, 1909.	504	3,463,897	Imp. 3,463,393
Chrome ore, tons	30	23,308	Imp. 23,278
Chrome ore, '09	.....	18,175	Imp. 18,175

Copper, lead and nickel (and antimony from Aug. 5, 1909) include the metal contents of ores, matte, bullion, etc. The exports given include reëxports of foreign material. Zinc contents of ore imported in 1910 were 25,257,849 lb.; not reported prior to date of new tariff. Quantity of antimony ore is not reported this year, only metal contents being given. Imports of aluminum are not reported. Exports of copper sulphate this year were equivalent to 859,929 lb. copper.

Spanish Metal Exports

Exports of metals and minerals from Spain, five months ended May 31, reported by *Revista Minera*, in metric tons:

Metals.	1909.	1910.	Changes.
Pig and manuf. iron	25,465	18,955	D. 6,510
Copper	8,249	6,596	D. 1,653
Copper precipitate..	6,945	5,918	D. 1,027
Lead.....	71,139	76,009	I. 4,870
Zinc.....	830	646	D. 184
Quicksilver.....	1,249	1,030	D. 219
Minerals.			
Iron ore.....	3,125,306	3,825,948	I. 700,642
Manganese ore.....	4,587	2,734	D. 1,857
Copper ore.....	489,869	422,625	D. 67,246
Lead ore.....	1,341	1,461	I. 120
Zinc ore.....	53,733	55,006	I. 1,274
Pyrites, iron.....	551,424	607,901	I. 56,477
Salt.....	290,180	237,987	D. 52,193

Imports of phosphates, 38,955 tons in 1909, and 47,081 in 1910; nitrate of soda, 18,287 tons in 1909, and 20,533 this year.

Zinc and Lead Ore Markets

Joplin, Mo., July 30—The highest price reported paid for zinc sulphide ore was $44 per ton, the base ranging from $41 down to $37 per ton of 60 per cent. zinc. Zinc silicate sold at $20@23 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $36.66. Lead is still $49 per ton for ores of 80 per cent. lead or better, with deductions of $1 per ton for each 1 per cent. under grade. The average price, all grades of lead, was $48.36 per ton.

The production was reduced about Webb City from a shortage of electric

SHIPMENTS, WEEK ENDED JULY 30.

	Zinc, lb	Lead lb.	Value.
Webb City-Carterville	3,200,140	660,170	$76,976
Joplin.....	1,539,670	230,620	35,605
Jackson.....	918 150	18,480	17,890
Alba-Neck.....	812 570	.....	17,469
Duenweg.....	679,590	97,990	13,479
Galena.....	536,870	37,740	11,125
Oronogo.....	336,540	173,050	11,000
Granby	636,610	37,580	9,905
Carthage.....	275,450	.....	5,784
Aurora.....	338,730	.....	5,106
Miami.....	295,650	63,850	4,513
Carl Junction.....	150,760	.....	3,310
Spurgeon.....	207,150	36,330	3,060
Badger.....	135,990	.....	2,720
Sarcoxie.....	51,860	.....	1,089
Saginaw.....	39,700	.....	357
Peoria.....	24,540	.....	221
Totals	10,189,970	1,355,810	$219,609
7 months.....	38,010,430	50,189,710	$7,965,508

Zinc value, the week, $186,815; 7 mos., $6,675,215
Lead value, the week, 32,794; 7 mos., 1,290,293

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January.....	$41.25	$47.31	$38.46	$45.16	$52.17	$56.99
February....	36.94	40.69	34.37	39.47	50.50	53.64
March.....	37.40	43.60	34.71	39.71	50.82	51.26
April.....	38.63	41.00	37.01	39.33	55.63	49.72
May.....	40.06	40.19	37.42	37.51	56.59	48.16
June.....	44.15	40.20	40.35	37.83	57.52	48.80
July.....	43.06	39.63	41.11	36.80	53.74	48.59
August.....	48.25	.....	44.54	.....	57.60	.....
September..	47.70	.....	44.87	.....	56.11	.....
October.....	49.50	.....	45.75	.....	55.02	.....
November...	51.31	.....	48.29	.....	53.94	.....
December...	49.45	.....	47.57	.....	55.26	.....
Year.....	$43.98	.....	$41.20	.....	$54.60	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

and natural gas supply. Wage reduction has taken place at some of the mines and a further reduction is talked of. In the adjustment of the wage scale to the lower level of prices there will be more or less loss of time, as many of the miners will hold out a week or two before accepting the reduction. It must come, however, sooner or later.

Platteville, Wis., July 30—No change in zinc prices reported. Lead, $50@51.

SHIPMENTS, WEEK ENDED JULY 30.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Galena	692,990	50,000	395,500
Platteville	572,700	66,060	.....
Highland	454,500	.....	.....
Mineral Point	364,300	.....	121,100
Cuba City	174,780	308,755	.....
Shullsburg	61,000	.....	.....
Livingston	.....	80,000	.....
Linden	.....	59,720	.....
Benton	.....	119,990	.....
Total	2,320,270	684,525	516,600
Year to date	48,859,846	4,843,244	12,787,165

In addition to the above there was shipped during the week to the separating plants, 2,998,983 lb. zinc concentrates.

Other Ore Markets

Iron Ore—Current quotations for Lake Superior ores, on dock at Lake Erie ports, are: Bessemer ore—base 55 per cent. iron and under 0.45 phosphorus—$5 per ton for Old Range and $4.75 for Mesabi; nonbessemer—base 51.5 per cent. iron—$4.20 for Old Range and $4 for Mesabi.

In the East there is no organization of sellers, and a wide range of prices exists, according to quality and location of mines. A good nonbessemer ore, around 50 or 55 per cent. iron, can be had at $3@3.50 per ton, f.o.b. mines; but no general quotations can be given.

Manganese Ore—The base price, as fixed by the large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent. or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess of phosphorus and silica.

Zinc Ore—For Rocky Mountain blende, delivered at Kansas smelting points, the current price is for the zinc content, less eight units, at the St. Louis price for spelter, less $14@15 per 2000 lb. of ore, according to quality, especially as to iron and lead content. See also Joplin and Wisconsin ore markets.

Pyrites—Domestic furnace sizes fetch 11@11½c. per unit, delivered at Eastern acid works; fines, 10¾@11c. Pyrites containing arsenic realize from ½@1½c. per unit less.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. for ore containing 60 per cent. of tungsten trioxide. For scheelite ores, 50c.@$1.50 per unit less.

CHEMICALS

New York, Aug. 3—The general market remains quiet, with no material changes to report.

Copper Sulphate—Sales are on a moderate scale, at unchanged prices; $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller parcels.

Arsenic—The market is still weak and sales have been light. Quotations are $2.25 per 100 lb. for white arsenic.

Nitrate of Soda—The market is more active and has a tendency to advance; but quotations continue unchanged, at 2.10c. per lb. for all positions.

Sulphate of Ammonia—The production of sulphate of ammonia in Great Britain for the year 1909 was: From gas works, 164,276; iron works, 20,228; shale oil works, 57,048; coke ovens, 82,886; gas producers and carbonizing work, 24,705; total 349,143 long tons, an increase of 24,915 tons over the preceding year.

Imports and Exports—Imports and exports of chemicals and raw materials in the United States, six months ended June 30:

	Imports.	Exports.	Excess.
Copper sulph. lb.	.....	3,439,717 E.	3,439,717
Copper sul., '09	.....	1,973,995 E.	1,973,995
Bleach, lb	46,546,428	..... I.	46,546,428
Bleach, 1909	43,934,246	10,607 I.	43,923,639
Potash salts, lb.	293,554,365	1,994,535 I.	291,559,830
Potash salts, '09	190,201,344	1,783,550 I.	188,417,794
Soda salts, lb.	16,809,329	264,678 I.	16,544,651
Soda salts, 1909	7,419,868	348,022 I.	7,071,846
Acetate lime, lb.	.....	33,936,749 E.	33,936,749
Acetate, 1909	.....	42,582,215 E.	42,582,215
Nit. of soda, tons	322,799	4,036 I.	318,763
Nitrate, 1909	181,159	4,884 I.	176,275
Phosphates, tons	10,277	512,165 E.	501,892
Phosphates, '09	6,077	450,338 E.	444,261
Sulphur, tons	16,072	9,107 I.	6,965
Sulphur, 1909	14,632	9,838 I.	4,794
Pyrites, tons	391,929	..... I.	391,929
Pyrites, 1909	354,813	..... I.	354,813
Magnesite, lb.	103,304,329	1,913,994 I.	128,390,335
Magnesite, 1909	.....	.....	.....

Exports include reëxports of foreign material. Figures for magnesite not reported prior to July 1, 1909. Estimating sulphur contents of pyrites, the total imports of sulphur in 1910 were 172,844 tons.

MINING STOCKS $

New York, Aug. 3—The general stock markets for the week have shown no definite tendency, but have been heavy and irregular on dealings which were almost entirely professional. The public is doing little or nothing in the way of buying and selling stocks just now. At the close there was a sharp upward turn.

Sloss-Sheffield was sold down on rumors that the dividend would be reduced. No definite statement with regard to this has appeared.

The Curb followed the lead of the Exchange for the most part. The Cobalt stocks and the gold stocks did not receive much attention. The copper shares were dull and irregular, with only fractional changes. For the most part the trading dragged, but there was a marked improvement today.

Auction sales of mining securities in New York, July 28, were: 100 shares Tennessee Copper Company, $25 par, $20.50 per share; 5000 shares Mountain View Mining and Milling Company, $2 for the lot; lot consisting of 1000 shares and $2000 bonds of Phœnix Gold Mining Company, 500 shares Alturas-Senate Mining Company, with 2192 shares various manufacturing companies, $255 for the lot.

Boston, Aug. 2—There is little change to note in the local copper-share market.

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	April.	May.	June.
Arizona, Ltd.	2,340,000	2,610,000	2,802,000
Balaklala	1,109,311	1,148,762	1,226,000
Boleo (Mexico)	2,777,800	2,735,680	2,115,314
Copper Queen	9,920,000	10,283,855	10,219,687
Calumet & Ariz.	2,400,000	1,778,000	2,490,000
Cananea (Mexico).	4,262,000	4,300,000	4,280,000
Detroit	1,930,000	2,035,639	2,017,000
Imperial	800,000	700,000	800,000
Nevada Con.	5,822 351	6 164,493	6,186,832
Old Dominion	2,325,000	2,174,000	2,092,000
Shannon	1,288,000	1,326,000	1,528,000
Superior & Pitts.	2,130 000	2,276,000	2,245,000
Utah Copper Co.	7,902,643	8,862,913	8,358,496
Butte District	25,000,000	24,850,000	23,750,000
Lake Superior	16,250,000	19,250,000	18,000,000
Total production.	87 257,105	90,495,342	88,130,329
Imports, bars, etc.	21,180,396	24,850,919	20,817,978
Imp. in ore & matte	12,527,371	6,487,243	5,579,618
Total	120,964,872	121,833,504	114,527,915

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report includes the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
VIII, 1909	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124.657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Year	1,405,403,056	705,051,591	680,942,620
I. 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,944,818	40,585,767
IV	117,477,639	67,985,951	31,332,434
V	123,242,476	59 305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	.....	.....	.....

	Visible Stocks.		
	United States.	Europe.	Total.
VIII, 1909	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I. 1910	141,766,111	244,204,800	385,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,817
VIII	.....	222,320,000	.....

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

A firm tone prevails generally, but there is an entire absence of commission business. Traders rally a few specialties occasionally. Late strength has been shown in North Butte, Lake Copper and Utah Consolidated.

Nothing is expected of the market until it adjusts itself to prevailing conditions. The sharp break in New York stocks has had a depressing effect, although it has not caused any material weakness in copper-share prices.

Today's sharp advance in Amalgamated brought no great response from the local copper-share list, although the undertone was strong.

Nothing of special interest has occurred on the Curb. Calaveras Copper continues under manipulation. The stock quoted is pooled stock and is no fair criterion of the actual market.

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev.	July 30	Aug. 24	$0.05
Best & Belcher, Nev	July 31	Aug. 24	0.10
Black Jack, Utah	Aug. 16		0.01
Bullion, Nev.	Aug. 11	Sept. 12	0.05
Con. Imperial, Nev.	July 31	Aug. 25	0.01
Con. Virginia, Nev.	Aug. 1	Aug. 26	0.25
Ely Cons., Nev.	Aug. 17		0.05
Gould & Curry, Nev.	July 17	Aug. 10	0.10
Hale & Norcross, Nev.	Aug. 2	Aug. 26	0.10
Hancock Con., Mich.	Au.Oct.		3.00
Julia, Nev.	Aug. 6	Sept. 6	0.03
King Philip Copper, Mich.	Aug. 9		1.00
Live Oak, Ariz.	Oct. 1		3.00
Lower Mammoth, Utah	Aug. 15		0.05
Mexican, Nev	July 23	Aug. 17	0.20
New York, Utah	Aug. 15		0.02
Opex, Utah	Aug. 29		0.03
Ophir, Nev.	July 4	Aug. 2	0.25
Raven, Mich.	Aug. 15		0.10
Scorpion, Nev.	Aug. 11	Sept. 6	0.02
Silver Hill, Nev.	July 27	Aug. 22	0.05
Winona, Mich.	Aug. 9		1.00

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	51.454	23.227	23.690
April	51.428	53.221	23.708	24.483
May	52.905	53.870	24.343	24.797
June	52.538	53.462	24.166	24.651
July	51.043	54.150	23.519	25.034
August	51.125	.....	23.588	.....
September	51.440	.....	23.743	.....
October	50 923	.....	23.502	.....
November	50.703	.....	23.351	.....
December	52.226	.....	24.030	.....
Total	51.502	.....	23.706	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

	New York.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	13.255	12.826	13.586	56.231	59.214
April	12.56½	12.733	12.93½	13.091	57.363	57.238
May	12.893	12.550	13.238	12.885	59.338	56.313
June	13.214	12.404	13.548	12.798	59.627	55.310
July	12.880	12.215	13.363	12.570	58.556	54.194
August	13.007	.....	13.296	.....	59.393	.....
September	12.870	.....	13.210	.....	59.021	.....
October	12.700	.....	13.030	.....	57.551	.....
November	13.125	.....	13.354	.....	58.947	.....
December	13.298	.....	13.647	.....	59.906	.....
Year	12.982	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	28.060	32.700	July	29.125	32.685
February	28.290	32.920	August	29.966	.....
March	28.727	32.463	September	30.293	.....
April	29.445	32.976	October	30.475	.....
May	29.225	33.125	November	30.859	.....
June	29.322	32.769	December	32.913	.....
			Av. Year	29.725	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1909	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	4.459	3.835	4.306	13.438	13.063
April	4.108	4.376	4.051	4.229	13.297	12.641
May	4.250	4.315	4.214	4.104	13.225	12.550
June	4.300	4.34-	4.291	4.05	13.031	12.688
July	4.321	4.404	4.188	4.291	12.563	12.531
August	4.365	.....	4.227	.....	12.475	.....
September	4.342	.....	4.215	.....	12.781	.....
October	4.341	.....	4.215	.....	13.175	.....
November	4.375	.....	4.252	.....	13.047	.....
December	4.500	.....	4.459	.....	13.125	.....
Year	4.275	.....	4.153	.....	13.049	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.991	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.562	23.188
March	4.757	5.637	4.607	5.487	21.438	23.031
April	4.965	5.439	4.815	5.289	21.531	22.469
May	5.124	5.191	4.974	5.041	21.975	22.100
June	5.462	5.128	5.252	4.978	22.000	22.219
July	5.472	5.152	5.252	5.002	21.969	22.406
August	5.729	.....	5.579	.....	22.125	.....
September	5.736	.....	5.646	.....	22.906	.....
October	6.199	.....	6.043	.....	23.200	.....
November	6.381	.....	6.231	.....	23.188	.....
December	6.249	.....	6.099	.....	23.094	.....
Year	5.503	.....	5.352	.....	22.201	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.98	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	18.53	15.84	16.93	15.62	17.00
April	15.79	18.28	15.05	16.84	15.06	16.75
May	15.77	17.10	15.02	15.94	15.08	16.18
June	16.13	16.52	15.84	15.60	15.63	15.53
July	16.40	16.40	15.90	15.40	15.96	15.40
August	17.16	.....	16.17	.....	16.20	.....
September	18.44	.....	16.80	.....	17.03	.....
October	19.75	.....	17.84	.....	18.02	.....
November	19.90	.....	18.37	.....	18.09	.....
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS Aug. 2

Name of Comp.	Bid.
Listed:	
Acacia	.05⅞
Cripple Cr'k Con.	.02½
C. K. & N.	.18½
Doctor Jack Pot	.10
Elkton Con.	.76½
El Paso	.85
Fannie Rawlins	‡.05½
Findlay	.10
Gold Dollar	‡.14½
Gold Sovereign	.03½
Isabella	.18
Mary McKinney	‡.53
Pharmacist	.03
Portland	1.16
Vindicator	.92
Work	.03½
Unlisted:	
Golden Cycle	1.00
United Gold Mines	‡.07½

SALT LAKE Aug. 2

Name of Comp.	Clg.
Carisa	.19
Colorado Mining	.31
Columbus Con.	.46½
Daly Judge	4.50
Grand Central	1.03
Iron Blossom	.72
Little Bell	1.10
Little Chief	.22
Lower Mammoth	.15
Mason Valley	6.50
Maj. Mines	‡.53
May Day	.02½
Nevada Hills	2.25
New York	‡.13
Prince Con	.69
Red Warrior	6.00
Silver King Coal'n	2.07½
Sioux Con.	.20½
Uncle Sam	.20
Victoria	1.07½

SAN FRANCISCO. Aug. 2.

Name of Comp.	Clg.	Name of Comp.	Clg.
COMSTOCK STOCKS		MISC. NEVADA	
Alta	‡ 09	Belmont	3.87
Belcher	.70	Daisy	.04
Best & Belcher	.33	Jim Butler	.22
Caledonia	.45	MacNamara	.32
Challenge Con.	.18	Midway	.23
Chollar	.20	North Star	.05
Confidence	.65	West End Con.	.59
Con. Cal & Va.	.81	Atlanta	.12
Crown Point	.55	Booth	.13
Exchequer	.17	C.O.D. Con.	‡.06
Gould & Curry	.23	Columbia Mt.	.04
Hale & Norcross	.25	Comb. Frac.	.49
Mexican	1.22	Great Bend	.02
Ophir	1.22	Jumbo Extension	.51
Overman	.85	Oro	.09
Potosi	.36	Red Hill	.02
Savage	.24	Sandstorm	.04
Sierra Nevada	.27	Silver Pick	.07
Union Con.	.39	St. Ives	.10
Yellow Jacket	.60	Tramps Con.	.04

N. Y. EXCH. Aug. 2

Name of Comp.	Clg.
Amalgamated	64
Am. Agri. Chem.	‡35
Am.Sm.&Ref.,com	66⅛
Am. Sm. & Ref., pf.	101⅜
Anaconda	38
Bethlehem Steel	24½
Col. & Hock. C. & I.	‡4¼
Colo. Fuel & Iron	27½
Du Pont P'd'r, pf.	‡84¾
Federal M. & S.	‡55
Great Nor., orectf.	53
Nat'nalLead,com.	50
National Lead, pf.	‡100½
Nev. Consol.	19
Pittsburg Coal	15
RepublicI&S,com.	28¾
Republic I & S, pf.	89
SlossSheffi'd,com.	57
Sloss Sheffield, pf.	‡103
Tennessee Copper	22⅜
Utah Copper	44¼
U. S. Steel, com.	68¾
U. S. Steel, pf.	115
Va. Car. Chem.	57⅞

N. Y. CURB Aug. 2

Name of Comp.	Clg.
Bonanza Creek	3
Boston Copper	18
Braden Copper	3½
B. C. Copper	5
Buffalo Mines	2⅜
Butte Coalition	18
Caledonia	1
Chino	12
Cobalt Central	10
Cobalt Prov.	59
Con. Ariz. Sm.	1⅜
Cumberland Ely	9
Davis-Daly	1 11/16
Dominion Cop.	7
Ely Con.	.21
El Rayo	3¼
Florence	2 7/16
Gila Copper	5
Giroux	6¼
Gold Hill	⅞
Goldfield Con.	8⅜
Greene Cananea	6¾
Guanajuato	1⅝
Guggen. Exp.	185
Kerr Lake	7⅛
La Rose	3⅞
McKinley-Dar-Sa.	.96
Miami Copper	19⅞
Mines Co. of Am.	59
Mont. Shoshone	.37½
Mont.-Tonopah	.98
Nev. Utah M. & S.	½
New Baltic	5
Newhouse M. & S.	3½
Nipissing Mines	10¾
Ohio Copper	1 1/16
Pacific Sm. & M.	½
Ray Central	2¼
Ray Con	17⅛
Silver Queen	.35
Standard Oil	600
Stewart	1 1/16
Tonopah	8¼
Tonopah Ex.	.84
Tri-Bullion	⅝
W. Va. Wyo. Cop.	2 1/16
Yukon Gold	4 1/16

LONDON Aug. 3

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton'sInd.	0 3 3
Camp Bird	1 7 3
Esperanza	2 13 9
Tomboy	0 16 3
El Oro	1 6 3
Oroville	0 6 6
Mexico Mines	8 12 6

BOSTON EXCH. Aug. 2

Name of Comp.	Clg.
Adventure	4⅛
Allouez	38
Am. Zinc	22⅛
Arcadian	4¼
Arizona Com.	14¼
Atlantic	6
Boston Con.	15
Butte & Balak	10⅞
Calumet & Ariz.	50½
Calumet & Hecla	520
Centennial	15
Con. Mercur	5
Copper Range	62
Daly-West	6¾
East Butte	7
Franklin	10¼
Granby	31½
Hancock	16¾
Helvetia	2
Indiana	11½
Isle Royale	16¾
Keweenaw	2¾
Lake	36
La Salle	9½
Mass.	7
Michigan	4½
Mohawk	44⅛
Nevada	19
North Butte	23¾
North Lake	7¾
Ojibway	5⅞
Old Dominion	33½
Osceola	122
Parrot	12
Quincy	70
Shannon	9½
Superior	41¾
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Emery, in kegs; Turkish flour	"	.01½@.02
Grains	"	.03½@.04
Naxos flour	"	.01½@.02
Grains	"	.03½@.04
Chester flour	"	.01½@.02
Grains	"	.03½@.04
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Grains, in kegs	"	.02¾@.03
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Lump, per quality	"	.03½@.30
Rottenstone, ground	"	.02@.04
Lump, per quality	"	.05@.20
Rogue, per quality	"	.05@.30
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Acetic 28%	lb.	.02½
Boric	"	.07
Hydrofluoric, 30%	"	.02¾@.03½
" 48%	"	.06
" 52%	"	.06½
" 60%	"	.10
Hydrochloric acid, 20° per 100 lb.		1.25@1.50
Nitric acid, 36° to 40°	per lb.	.03½@.04½
Sulphuric acid, 50°, bulk per ton.		$12 up
60°, 100 lb. in carboys.		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys.		1.00@1.10
66°, bulk, ton		18.00
Oxalic	per lb.	.07½@.07¾
ALCOHOL—Grain 95%	gal.	2.52@2.55
Denatured	"	.42
Refined wood, 95@97%	"	.52@.57
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	"	.04½@.05
ALUMINUM—Sulphate, com'l.	lb.	1.50@2.00
AMMONIA—24 deg. lb	"	.04½@.05½
" 26 deg. lb	"	.04¾@.05¼
AMMONIUM—		
Bromide	lb.	.28
Carbonate	"	.08@.08¾
Muriate grain	"	.05½@.06½
Lump	"	.09½@.09½
Sulphate, 100 lb	"	2.75@3.00
Sulpho-cyanide com	"	.25
" chem. pure	"	.35
ANTIMONY—needle, lump	lb.	.04½@.05
Oxide	"	.07¾@.08
ARSENIC—white	"	.02½@.02½
Red, Outside brands	"	.06½@.07
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Gilsonite, Utah ordinary	per ton.	32.00@40.00
Trinidad	"	20.00@30.00
California	per ton.	25.00@30.00
BARIUM—		
Carb. Lump. 80@90%	lg. ton.	26.00@35.00
Precipitated, 96@98%	"	33.00@35.00
Powdered, natural	lb.	.02@.02½
Chloride com'l	ton.	32.00@35.00
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Foreign	"	2.25@2.90
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(in sacks)	"	.65
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Bricks, f.o.b. Pittsburg, per M.		175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	ton.	8.00@9.00
Foreign	"	11.50@18.00
COBALT—Oxide	lb.	.80@.85
COPPERAS—Bulk	100 lb.	$0.55
In bbls	"	.65@.80
In bags	"	.60@.75
CRYOLITE (carload)	lb.	.06½@.07
FELDSPAR—Ground	sh. ton.	6.00@14.00
FIRE BRICK—		
American	per M.	30.00@40.00
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St. Louis	"	16.00
Extra	"	20.00@23.00
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St. Louis, extra quality	per ton.	5.00
" ordinary	"	2.50
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Lump	ton.	8.00@10.00
Ground	"	12.00@14.00
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Powdered	"	.80@.85
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Flying dust, finest to best	lb.	.02@.04
Dust	"	.02½@.05
Chip	"	.04@.08
Lump	"	.05½@.12
Large lump	"	.08¼@.10½
GYPSUM—		
Fertilizer	sh. ton.	5.00
Ground	"	4.00@7.00
INFUSORIAL EARTH—		
Ground Am. Best	lb.	.01½@.02½
German	"	.02½@.02¾
LEAD—Acetate (sugar of) brown,	lb.	.07¾@.09½
Nitrate, com'l	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.50@8.50
Calcined, powdered	sh. ton.	26.00@37.00
Brick, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	100 lb.	.90@1.25
Sulphate (Epsom salt)	100 lb.	.90@1.00
MANGANESE—		
Foreign, crude, powdered:		
70@75% binoxide	lb.	.01@.01½
75@85% binoxide	"	.01½@.01¾
85@90% binoxide	"	.01¾@.04
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	16.00@32.50
MARBLE—Flour	sh. ton.	7.00@9.00
MINERAL WOOL—		
Slag, ordinary	sh. ton.	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, normal	lb.	.08 and up
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.10½@.11
Sulphate, double	"	.05½@.08
NITRATE OF SODA—		
100 lb. 95%		2.07½@2.10
95% for 1910		2.07½@2.10
96% is 2½@7½c. higher per 100 lb.		
OZOKERITE—best	lb.	.14@.17
PAINTS AND COLORS—		
Litharge, Am. powdered	lb.	.05¾@.06½
English glassmakers'	"	.08½@.09¼
Lithophone	"	.03½@.07
Metallic, brown	sh. ton	16.50@30.00
Red	"	14.00@18.00
Ocher, Am. common	"	10.00@15.00
Best	"	12.00@15.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02
Paris green, pure, bulk	"	.17½@.20½
Red lead, American	"	.06½@.07
Foreign	"	.08½@.09½
Turpentine, spirits bbl., per gal.		.72@.73¾
White lead, Am., dry	lb.	.05¾@.06½
American, in oil	"	.07@.07½
Foreign, in oil	"	.09@.09¾
Zinc white, Am. extra dry	"	.05¾@.06½
French, proc's, red seal, dry	"	.07½@.08
French, process, green seal, dry	"	.10@.10½
PHOSPHATES—Acid		.55@60c. per unit
*Fla., hard rock 77%		6.00@6.50
land pebble 68%		3.75@4.00
†Tenn., 78@80%		5.00@5.50
75%		4.75@5.00
68@72%		4.25@4.50
‡So. Car. land rock 60%		3.50@4.00
POTASSIUM—		
Bicarbonate crystal	lb.	$.078
Powdered or granulated	"	.0½
Bichromate, Am.	"	.07½@.08
Scotch	"	.10¼
Bromide	"	.20
Carbonate (80@85%)	"	.03½@.04½
Caustic, ordinary	"	.03½@.05½
Elect. (90% KOH)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.08½@.09½
Crystals	"	.09@.09¼
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots		18½c.
Less than 5 tons		.19
Kainite, long ton, bulk, 7.50; bags,		9.25
Permanganate	lb.	.09½@.10½
Prussiate, yellow	"	.13@.13½
Red	"	.29@.32
Sulphate (basis 90%)	100 lb.	2.18@2.21
PYRITE—		
Domestic, non-arsenical, furnace size, f.o.b. R. R.	per unit.	11@11½c.
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10½@11c.
Imported, non-arsenical, furnace size, ex-ship, per unit		.12½@.13
Imported, arsenical, furnace size, ex-ship, per unit		.12@.12½
Imported fines, arsenical, ex-ship, per unit		.09@.09½
Imported fines, non-arsenical, ex-ship, per unit		10½@11c.

Pyrite prices are per unit of sulphur. A deduction of 25c. per ton is made when ore for furnace is delivered in large lumps.

SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.13
N. Y. agricultural	sh. ton.	3.80@4.50
SALTPETER—Crude	100 lb.	4.00@4.50
Refined, crystals	"	5.00@5.75
SILICA—		
Ground quartz, ord'ry.	lg. ton	7.00@15.00
Silex, ground	"	7.00@15.00
Silex, floated	"	35.00@40.00
Lump quartz	"	5.00@5.50
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.33½@.36¾
SODIUM—Acetate	lb	.04½@.05
"Alkali," per 100 lb., 58/48		.90@.95
Bicarb. soda, per 100 lb		1.00@1.30
Soda, caustic, per 100 lb., 78/60		1.72½@1.85
Soda, caustic, powdered		.02½@.03
Salt cake, per 100 lb., bulk		.50@.60
Salt cake, bbl		.65@.85
Soda, monohydrate, per lb.		1.30@1.75
Bichromate	lb.	.05½@.06½
Bromide	"	.20
Chlorate, com'l	"	.08¼@.09½
Cyanide, 120-130% KCN, per 100%		
Carloads (30,000 lb.)	lb.	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	.20
Hyposulphite, Am.	"	1.30@1.50
Phosphate	100 lb.	2.10@2.40
Prussiate	"	.08½@.09
Sal soda, f.o.b. N. Y.	"	.60@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	"	.65@1.00
Sulphate, com'l (Glauber's salt)	100 lb.	.60@.80
Sulphate, com'l, calcined		.65@.85
STRONTIUM—Nitrate	lb.	.07@.08
SULPHUR—Louisiana (prime) to New York	lg. ton.	22.00 up
To Boston, Philadelphia or Baltimore	"	22.50 up
Roll	100 lb.	1.85@2.15
Flour	"	2.00@2.40
Flowers, sublimed	"	2.20@2.60
Powdered commercial, bags		1.55
Sicilian, extra qual., unmixed seconds, crude brimstone to New York	lg. ton.	$22.00
TERRA ALBA—Fr. & Eng.	100 lb.	.70@1.00
TALC—Domestic	sh. ton.	12.00@20.00
French	"	15.00@25.00
Italian, best	"	30.00@40.00
TIN—Bi-chloride, 50°	lb.	.10
Crystals	"	.22½@.24
Oxide, lb	"	.37@.40
URANIUM—Oxide	"	2.20@4.25
ZINC—Chloride sol., com. 20°	"	.02½
Chloride, granular	"	.04@.04½
Dust	"	.02@.02½
Sulphate	"	.02@.02½

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pelasant. ‡On vessel Ashley River, S. C.

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations are substantially representative. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output as a matter of private contract.

Mining and Metallurgical Companies—U. S.

Name of Company and Situation.		Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Alas	180,000	$ 5	$ 2,634,381	May '10	$0.30
Alaska Treadwell, g.	Alas	200,000	25	11,335,000	May '10	0.50
Alaska United, g.	Alas	180,200	5	721,110	May '10	0.20
Amalgamated, c.	Mont	1,538,879	100	62,040,445	Aug. '10	0.50
Am. Sm.&Ref.,com.	U. S	500,000	100	18,000,000	July '10	1.00
Am. Sm. & Ref.,pf.	U. S	500,000	100	35,000,000	July '10	1.75
Am. Smelters, pf. A.	U. S	170,000	100	4,730,000	June '10	1.50
Am. Smelters, pf. B.	U. S	300,000	100	7,107,000	June '10	1.25
Am. Zinc,Lead&Sm.	Kan	80,120	25	360,120	July '10	0.50
Anaconda, c.	Mont	1,200,000	25	46,500,000	Apr. '10	0.50
Argonaut, g.	Cal	200,000	5	1,130,000	Nov. '09	0.20
Arizona Copper, pf.	Ariz	1,266,120	1.20	1,290,418	Apr. '10	0.047
Arizona Copper,com.	Ariz	1,519,896	1.20	12,204,916	July '10	0.30
Atlantic, c.	Mich	100,000	25	990,000	Feb. '05	0.02
Bald Butte, g. s.	Mont	250,000	1	1,354,648	Oct. '07	0.04
Beck Tunnel, g. s. l.	Utah	1,000,000	0.10	675,000	Oct. '07	0.02
Boston & Montana.	Mont	150,000	25	70,025,000	Apr. '10	3.00
Bull. Beck.&Cham.,g	Utah	100,000	10	2,728,400	July '08	0.10
Bunker Hill& Sull.	Ida	327,000	10	11,835,300	July '10	0.30
Butte Coalition, c.s.	Mont	1,000,000	15	3,450,000	Aug. '10	0.25
Calumet&Arizona, c.	Ariz	200,000	10	11,300,000	June '10	1.00
Calumet & Hecla, c.	Mich	100,000	25	112,050,000	June '10	7.00
Camp Bird, g s.	Colo	820,000	5	5,766,650	Oct. '09	0.24
Colorado, l. s.	Utah	1,000,000	0.20	2,210,000	June '10	0.08
Columbus Con., c.	Utah	285,540	5	226,832	Oct. '07	0.20
Con. Mercur., g.	Utah	1,000,000	1	3,385,313	Dec. '06	0.02½
Continental, z. l.	Mo	22,000	25	231,000	Oct. '08	0.25
Copper Range Con.	Mich	384,185	100	9,080,406	July '10	1.00
Creede United, g.	Colo	1,625,000	1	214,053	July '06	0.00½
Daly Judge, g. s. l.	Utah	300,000	1	225,000	Apr '07	0.37½
Daly West, g. s. l.	Utah	180,000	20	6,201,000	July '10	0.30
De Lamar, g. s.	Ida	80,000	5	835,200	Sept. '06	0.24
Doe Run, l.	Mo	65,749	100	2,349,751	June '10	1.50
Elkton Con., g.	Colo	2,500,000	1	2,554,460	June '10	0.01½
El Paso, g.	Colo	2,450,000	1	1,389,045	Mar. '10	0.01
Fed. M. & Sm., com.	Idaho	60,000	100	2,708,750	Jan. '09	1.50
Federal M & S., pf.	Idaho	120,000	100	5,741,250	June '10	1.75
Findley, g.	Colo	250,000	1	337,500	Sept. '06	0.01
Florence, g.	Nev	1,050,000	1	735,000	Apr. '10	0.10
Frances-Mohawk, g.	Nev	912,000	1	546,000	Jan. '08	0.05
Gemini-Keystone.	Utah	5,000	100	2,000,000	Aug. '07	10.00
Gen. Dev. Co.	U. S	260,000	100	2,639,000	Mar. '10	1.00
Goldfield Con., g.	Nev	3,558,367	10	9,247,652	July '10	0.50
Grand Central,g.	Utah	250,000	1	1,331,250	Dec. '09	0.04
Granite g.	Colo	1,650,000	1	247,000	Dec. '09	0.01
Guggenheim Expl.	U. S	207,933	100	10,010,492	July '10	2.50
Hecla, s. l.	Idaho	1,000,000	0.25	2,010,000	July '10	0.02
Homestake, g.	S. D	218,400	100	25,682,840	July '10	0.50
Horn Silver, g.s.c.z.l.	Utah	400,000	25	5,642,000	Sept. '07	0.05
Imperial, c.	Ariz	500,000	10	300,000	June '07	0.20
Inter'l Nickel, pf.	N. Y	89,126	100	4,891,945	Aug. '10	1.50
Inter'l Sm. & Ref.	Utah	100,000	100	950,000	Sept. '10	2.00
Iron Blossom, s.l.	Utah	1,000,000	100	620,000	June '10	0.06
Iron Silver, s. l.	Colo	500,000	20	4,250,000	Apr. '10	0.10
Jamison, g.	Cal	390,000	10	370,500	Jan. '10	0.02
Jerry Johnson, g.	Colo	2,500,000	0.10	100,000	Dec. '09	0.01
Kendall, g.	Mont	500,000	5	1,275,000	Oct. '08	0.02
Liberty Bell, g. s.	Colo	130,551	5	228,353	June '09	0.15
MacNamara, s. g.	Nev	728,341	1	40,213	May '10	0.02½
Mammoth, g. s. l.	Utah	400,000	2.50	2,220,000	Mar. '08	0.05
Mary McKinney, g.	Colo	1,309,252	1	894,363	June '10	0.01
May Day, g. s. l.	Utah	800,000	0.25	108,000	Sept. '08	0.01½
Mohawk M. Co.	Mich	100,000	25	2,050,000	Feb. '10	1.00
Mont. Ore Purch.	Mont	80,833	25	9,437,274	Jan. '07	15.00
Nevada Cons., c.	Nev	1,151,200	5.00	1,294,900	Mar. '10	0.37½
Nevada Hills, s.g.	Nev	746,000	5	373,000	Dec. '07	0.10
New Century, z.l.	Mo	300,000	1	216,000	Oct. '09	0.01
Newhouse M. & S. c.	Utah	600,000	10	300,000	Sept. '07	0.50
New Idria, q.	Cal	100,000	5	1,260,000	July '10	0.30
New Jersey Zinc	U. S	100,000	100	12,000,000	May '08	4.00
North Butte, c.	Mont	400,000	15	8,800,000	Mar. '10	0.50
North Star, g.	Cal	250,000	10	2,686,999	June '10	0.50
Old Dominion, c.	Ariz	293,245	25	1,440,658	Jan. '10	0.50
Old Domin'n,M&Sm.	Ariz	162,000	25	1,225,500	July '10	0.25
Ophir, g. s.	Nev	201,600	3	1,816,360	May '08	0.10
Oroville Dredg'g Lt.g.	Cal	700,000	5	1,383,036	Dec. '09	0.12½
Osceola, c.	Mich	96,150	25	8,958,650	July '10	4.00
Parrot, c. s.	Mont	229,850	10	6,807,649	Sept. '07	0.25
Phelps, Dodge & Co.	U. S	449,346	100	7,638,882	June '10	2.50
Portland, g.	Colo	3,000,000	1	8,557,080	Apr. '10	0.02
Quartette. g. s.	Nev	110,000	10	375,000	July '07	0.20
Quincy, c.	Mich	110,000	25	19,192,500	June '10	1.25
Round Mountain, g.	Nev	800,000	1	292,650	June '10	0.04
St. Joseph, l.	Mo	1,000,000	10	7,058,357	June '10	0.15
Shannon, c.	Ariz	100,000	10	450,000	July '07	0.50
Silver King Co't'n.†	Utah	1,250,000	5	1,659,885	Jan. '10	0.15
Sioux Con., s. l. g.	Utah	746,389	1	723,073	Apr. '10	0.04
Snow Storm, s. l.	Ida	1,500,000	1	960,000	July '10	0.01½
Standard Con., g.s.	Cal	178,394	10	5,327,925	Jan. '10	0.75
Stratton's Independ.	Colo	1,000,000	5	5,395,865	Apr. '10	0.50
Swansea, g. s. l.	Utah	100,000	5	329,500	Mar. '07	0.05
Tamarack, c.	Mich	60,000	25	9,420,000	July '07	4.00
Tennessee, c.	Tenn	200,000	25	2,306,250	Dec. '09	1.25
Tomboy, g. s.	Colo	300,000	4.85	2,473,500	June '10	0.48
Tonopah of Nev, s g.	Nev	1,000,000	1	6,050,000	July '10	0.40
Tonopah Belm't, s.g.	Nev	1,500,000	1	600,000	Apr. '07	0.10
Tonopah Ext'n, s. g.	Nev	943,433	1	283,030	Apr. '06	0.15
Tonopah Midw'y,s.g.	Nev	1,000,000	1	250,000	Jan. '07	0.05
Uncle Sam, g. s. l.	Utah	500,000	1	340,000	Dec. '09	0.02
United Cop. com.	Mont	450,000	100	5,962,500	Aug. '07	1.75
United, c. pf.	Mont	50,000	100	1,500,000	May '07	3.00
United, z. l., pf.	Mo.-Kan.	19,556	25	312,782	Jan. '08	0.50
United Verde, c.	Ariz	299,927	10	.....	June '10	0.75
U.S.Sm.R.&M.,pf.	U. S	351,010	50	2,807,252	Apr. '10	0.87½
U.S.Sm.R.& M.,com.	U. S	486,044	50	6,826,011	Apr. '10	0.50
U. S. Red. & Ref. Pf.	Colo	39,458	100	1,005,504	Oct. '07	1.50
Utah, g. (Fish Sp'gs)	Utah	100,000	10	323,000	Feb. '09	0.02
Utah Con., c.	Utah	300,000	5	6,900,000	Jan. '10	0.50
Utah Copper	Utah	733,624	10	3,260,861	June '10	0.75
Victoria, Utah	Utah	250,000	1	182,000	Dec. '09	0.02
Vindicator Con., g.	Colo	1,500,000	1	2,092,500	Jan. '10	0.03
Wolverine, c.	Mich	60,000	25	5,700,000	Sept. '09	5.00
Work, g.	Colo	1,500,000	1	172,500	July '08	0.01
Yankee Con	Utah	1,000,000	1	182,500	Jan. '07	0.03
Yellow Aster, g.	Cal	100,000	10	958,789	Aug. '07	0.20
Yukon Gold, g.	U.S.&Can.	3,500,000	5	1,400,000	June '10	0.10

Divided previous to consolidation. *$1,436,250. †$11,187,500.

Coal, Iron and Other Industrials—United States

Name of Company and Situation.		Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Allis-Chalmers, pf.	U. S	161,500	$100	$3,108,875	Feb. '04	$1.75
Amer. Ag.Chem., pf.	U. S	181,530	100	2,836,800	Apr. '10	3.00
American Cement.	Penn	200,000	10	1,388,000	July '10	0.10
American Coal.	Md	50,000	25	2,609,687	Mar. '10	0.75
Bethlehem Steel, pf.	Penn	150,000	100	900,000	Nov. '06	0.75
Cambria Steel.	Penn	900,000	50	10,585,000	May '10	0.62½
Central C. & C., com.	Mo	51,250	100	2,690,625	Jan. '10	1.50
Central C. & C., pf.	Mo	18,750	100	1,479,999	Jan. '10	1.25
Col.&Hock.C.&I.,pf.	Ohio	69,244	100	591,550	Oct. '09	1.50
Consolidated Coal.	Ill	50,000	100	350,000	July '04	1.00
Consolidation Coal.	Md	190,247	100	x17,591,510	Apr. '10	1.50
Crucible Steel, pf.	Penn	244,365	100	9,102,596	Sept. '09	1.50
Empire S. & I., pf.	N. J	25,000	100	1,008,033	Jan. '10	1.50
Fairmont Coal.	W. Va	120,000	100	1,980,000	Jan. '09	2.00
General Chem., com.	U. S	74,103	100	z3,464,313	Sept. '10	1.25
General Chem., pf.	U. S	100,000	100	7,005,000	July '10	1.50
International Salt.	Penn	182,280	100	911,400	Dec. '06	1.00
Jeff.&Cl'f C.&I., cm.	Penn	15,000	100	330,000	Aug. '05	5.00
Jeff. & Cl'f C. & I.,pf.	Penn	15,000	100	1,012,500	Aug. '10	2.50
Kern River Oil.	Cal	20,000	100	84,000	July '08	0.18
Lehigh Coal & Nav.	Penn	382,260	50	y18,268,900	Aug. '10	2.00
Maryland Coal, pf.	Md	18,850	100	2,061,122	June '09	2.50
Monon. R. Coal, pf.	Penn	100,000	100	2,324,000	July '08	3.50
Nat. Carbon, com.	U. S	55,000	100	715,000	Apr. '08	1.00
Nat. Carbon, pf.	U. S	45,000	100	3,071,259	Nov. '08	1.75
National Lead, com.	N. Y	206,554	100	4,386,015	Oct. '10	0.75
National Lead, pf.	N. Y	243,676	100	19,529,574	June '10	1.75
Nat'l Steel& Wire,pf.	N. Y	25,778	100	631,561	May '06	1.75
New Central Coal.	Md	50,000	20	390,000	Nov. '08	0.40
New River Coal, pf.	W. Va	37,617	100	451,405	Nov. '08	1.50
Pacific Coast Borax.	Cal	19,000	100	2,086,500	Aug. '05	1.00
Peerless Oil.	Cal	92,000	10	711,000	June '08	0.06
Penna. Salt.	Penn	60,000	50	15,098,000	Oct. '08	3.00
Penna. Steel, pf.	Penn	165,000	100	8,662,500	Nov. '08	3.50
Phila. Gas, com.	Penn	664,800	50	*24,264,600	Feb. '09	0.75
Phila. Gas, pf.	Penn	120,000	50	2,850,000	Sept. '08	1.25
Pittsburg Coal, pf.	Penn	297,010	100	12,177,487	July '10	1.25
PocahontasC.C., pf.†	W. Va	28,000	100	336,000	July '09	3.00
Pocah'tasC.C., cm.†	W. Va	45,000	100	†406,800	Oct. '08	3.00
Republic I. & S., pf.	Ill.	204,169	100	9,262,998	July '10	1.75
Sloss-Sheffield, com.	Ala	100,000	100	2,383,000	June '10	1.25
Sloss-Sheffield, pf.	Ala	67,000	100	4,572,400	July '10	1.75
Standard Oil.	U. S	970,000	100	691,602,000	June '10	9.00
Tenn. C. & I., com.	Tenn	225,536	100	3,583,060	Nov. '07	1.00
Tenn. C. & I., pf.	Tenn	2,840	100	390,040	Nov. '07	2.00
Texas&Pacific Coal.	Texas	23,940	100	1,747,620	Apr. '09	1.50
Uni. Metals Selling.	U. S	50,000	100	5,875,000	Jan. '09	5.00
U.S. Steel Corp., cm.	U. S	5,083,025	100	116,387,717	Sept. '10	1.25
U. S. Steel Corp., pf.	U. S	3,602,811	100	269,414,620	Aug. '10	1.75
Va Carolina Ch., pf.	U. S	180,000	100	16,140,869	July '10	2.00
Warwick I. & S.	U. S	148,671	10	572,340	May '10	0.30
Westmoreland Coal.	Penn	60,000	50	8,880,000	Oct. '08	2.50

*Since 1894. †Since 1907. ‡Since 1890. xStock div. $6,130,000 Mar. '09. yStock div. $2,866,950 Jan. '10. zStock div. 10 per cent. Mar. '10.

Canada, Mexico, Central and South America

Name of Company and Situation.		Shares. Issued.	Par Val	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia	Mex	9,600	$ 50	$417,070	Apr. '08	$1.36
Batopilas.	Mex	446,486	20	†55,870	Dec. '07	0.12½
British Columbia, c.	B. C	591,709	5	236,683	Sept. '07	0.40
Buffalo, s.	Ont	1,000,000	1	767,000	July '10	0.08
Butters' Salvador, g.	Salv	150,000	4.85	2,764,500	.....	0.17½
Cobalt Central, s.	Ont	5,000,000	1	188,460	Aug. '09	0.01
Coniagas	Ont	800,000	5	1,280,000	July '10	0.15
Consolidated M. & S.	B. C	53,552	100	781,885	Nov. '07	1.25
Crow's Nest Pass.	B. C	160,000	25	2,018,648	July '07	0.62½
Crown Reserve, s.	Ont	1,750,000	1	2,158,828	July '10	0.15
Dolores, g. s.	Mex	400,000	5	954,866	May '10	0.22½
Dominion Coal, com.	N. S	150,000	100	3,900,000	Jan. '10	1.00
Dominion Coal, pf.	N. S	50,000	100	3,865,000	Feb. '10	3.50
Dos Estrellas, g.s.	Mex	300,000	0.50	5,430,000	Jan. '10	0.50
El Oro, g.s.	Mex	1,147,500	4.85	7,026,286	June '10	0.36
Esperanza, s.g.	Mex	455,000	4.85	10,178,567	June '10	0.36
Granby Con	B. C	135,000	100	3,778,630	Dec. '09	2.00
Greene Con. Copper.	Mex	864,000	10	6,194,400	Mar. '07	0.40
Guanajuato	Mex	540,000	5	74,250	Oct. '06	0.07
Guanajuato D., pf.s.	Mex	10,000	100	244,356	July '10	3.00
Hedley Gold, g.	B. C	120,000	10	108,000	July '10	0.30
Hinds Con., g.s.c.l.	Mex	5,000,000	1	100,000	Feb. '08	0.02
Kerr Lake, s.	Ont	600,000	5	2,430,000	Sept. '10	0.50
La Rose Con., s.	Ont	1,498,407	5	1,678,019	July '10	0.10
Le Roi, Ltd., g.	B. C	200,000	25	425,000	Dec. '06	0.48
Le Roi No. 2, g.	B. C	120,000	25	1,004,400	Mar. '10	0.48
Lucky Tiger-Com.,g.	Mex	715,000	10	731,250	July '10	0.05
McKinley-Darragh,s	Ont	2,247,692	1	696,784	July '10	0.05
Mex. Con. M.&S. Co.	Mex	240,000	10	660,000	Mar. '08	0.25
Mex. Mill.&Trans.pf.	Mex	10,500	100	65,858	July '08	3.00
Mines Co. of Am.	Mex	2,000,000	1	3,845,000	Aug. '10	0.03
N. Y. & Hond. Ros.	C. A	150,000	10	2,910,000	May '10	0.10½
Nipissing, s.	Ont	1,200,000	5	4,575,000	Jnne '10	0.25
N. S. St.&Coal, com.	N. S	60,000	100	1,140,279	Jan. '10	1.00
N. S. St. & Coal, pf.	N. S	10,300	100	721,000	Oct. '09	2.00
Peñoles	Mex	2,500	50	4,866,687	Dec. '07	10.00
Peregrina M. & M.,pf.	Mex	10,000	100	293,656	Mar. '10	3.50
Pinguico, pf. s.	Mex	20,000	100	420,000	Apr. '10	3.00
Reco, g.s.l.	B. C	985,000	1	332,482	Mar. '06	0.02
Right of Way Mines‡	Ont	1,685,500	1.00	392,063	Apr. '10	0.02
Rio Plata	Mex	373,437	5.00	102,694	June '10	0.10
Securities Corp., pf.	Mex	2,000	100	42,699	July '08	3.50
Silver Queen, s.	Ont	1,500,000	1	315,000	Dec. '08	0.03
Temiskaming, s.	Ont	2,500,000	1	525,000	Apr. '09	0.06
Tem. & Hud. Bay,s.	Ont	7,761	1	1,265,043	May '10	3.00
Teziutlan Copper.	Mex	10,000	100	.....	Dec. '08	1.20
Tilt Cove, c.	N. F	44,500	9.72	318,620	Dec. '09	0.24
Trethewey, s.	Ont	1,000,000	1	461,998	Dec. '09	0.15
Tyee, c.	B. C	180,000	5	284,310	Aug. '07	0.63

†Since reorganization. ‡Previous to Jan. 1910, $324,644.